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THE WAR AND THE LUMBER INDUSTRY

By BRISTOW ADAMS.

DURING the Balkan war, which is now looked upon as a minor affair in the light of the present European conflict, it was reported from Germany that the price of certain kinds of lumber had risen as the result of the demands for material for ammunition cases. With many times the demand at present, it is a fair conjecture that some lumber prices, in common with prices for other commodities, will rise, not only in warring countries but everywhere. At the same time, the activities of peace, now at a standstill over a large portion of Europe, have ceased their demands, and in addition, war imposes difficulties on commerce, which will hamper or even actually prevent the passage of goods from those who produce to those who want.

These, then, are the main fields of conjecture as to the war's effect on lumber: What depression is going to follow in the train of war, and where? Also, to look on the hopeful side, what are the possible increased demands due to war, and where may they be expected to arise?

THE DEPRESSING EFFECTS.

There may be, in countries at war, an increased demand, as with the Balkan ammunition boxes. But it is scarcely likely that the lumbermen of the United States can profit through these demands, because all such lumber would be contraband. Ship timbers have always been regarded as contraband by

Great Britain, and Germany is not going to be far behind in taking a similar view. In the contraband lists already made public it has been shown that all lumber which might even remotely be utilized in war or in distantly related projects is seizable. For example, railroad ties which might be used in repairing torn-up tracks, or in extending trackage for troop trains, would be seizable even in neutral ships. Any such material will be presumptively contraband if consigned to a port where military or naval equipment might be used. Even neutral goods in neutral bottoms may not enter blockaded ports, so, on the whole, little can be looked for except losses when it comes to questions of exports to nations at war.

LOSSES THROUGH COMMERCE.

There is no conjecture about this part of the situation. Already the shipment of lumber from the southern ports is entirely paralyzed. Great losses have already been sustained through the seizure of vessels which were on the high seas when war was declared, or through cargoes diverted to points at which the timber cannot readily be sold, because lumber intended for export to one country is very seldom in such shape as to be readily salable in another. Thus hewed timbers generally demanded by Great Britain find little market in a country which habitually takes sawed lumber.

This diversion of freight is going to

cause all sorts of trouble, and will be one of the big problems of the lumber exporter as long as the war lasts. Nor will there be any money returns from the diverted cargoes, and no settlement of claims until peace is again established. It will be understood, of course, that the present situation is temporary, but no one can tell how long it will last. Certainly it will continue as long as the nations are set against one another.

at the time this is written, it is indirectly in the toils.

In actual figures, the countries directly or indirectly involved in war take, in round numbers, 700,000,000 board feet of our timber, of which about 650,000,000 is southern yellow pine. Already, most of the firms cutting yellow pine for export have either closed down or have greatly curtailed their product. With Japan carrying belligerency into Asia and the Pacific,



EXPORTING SPANISH CEDAR LOGS FROM COSTA RICA.

THESE LOGS ARE FLOATED TO THE LUMBER FREIGHTERS BY OXEN, AND BY MOTOR BOAT. CABINET WOODS, EXCEPT THOSE FROM CENTRAL AND SOUTH AMERICA, HAVE COME MAINLY THROUGH GREAT BRITAIN, WHICH SHIPPED TO US LAST YEAR MORE THAN ONE-AND-A-HALF MILLION DOLLARS WORTH.

The southern timber regions of our country most keenly feel the effects of war, even though only about 10 per cent of the annual cut of yellow pine lumber is exported. One who has seen the square-rigged ships in Pensacola harbor, hailing from European ports, and going out laden, deck and hold, with southern pine, can readily imagine what a difference war is making in that busy port, and in others along our southeast coast. True, many of these vessels were Italian, manned by swart Mediterranean sailors, their papers made out in Leghorn, Genoa, or Venice. Yet, while Italy is not directly involved

the 50,000,000 board feet exported from the northwest coast is likely to be temporarily cut off from market.

During the twelve months ending June 30 our exports of timber to France, Germany, Italy, and the United Kingdom amounted to \$6,164,371; and sawed lumber exports were worth \$17,507,011. By far the larger part of this yearly income, which takes no count of furniture and other materials made chiefly of wood, amounting to \$23,671,382, or nearly two millions of dollars a month, is going to be lost to American producers while war continues.



LOADING ROSIN IN STEAMERS FOR FOREIGN PORTS AT SAVANNAH, GA.

IN NAVAL STORES THE SOUTH LOSES HEAVILY BY CURTAILMENT OF SHIPMENTS DUE TO THE WAR. A COMPARISON OF THE FIGURES OF TOTAL PRODUCTION WITH THOSE OF EXPORTS TO THE COUNTRIES NOT ENGAGED IN THE WAR SHOWS THAT BY FAR THE GREATER PROPORTION OF NAVAL STORES PRODUCED HAS BEEN GOING TO THEM.

In naval stores again the south loses heavily. Austria, Belgium, Germany, Italy, Russia, and the United Kingdom take rosin worth \$7,598,233, and turpentine valued at \$4,719,781, a total of \$12,318,014. Most of this will be cut off from market, for Germany alone takes \$4,823,815 worth, and commerce with Germany does not now exist. France, being a producer and exporter of naval stores, does not take our southern product. The latest figures (1909) on the total production of rosin give 3,263,857 barrels, valued at \$12,576,721. In that year the total production of turpentine was 28,988,954 gallons, valued at \$12,654,228. There can be no doubt that since these Census figures were gathered the quantity of rosin and turpentine produced has fallen off and the value has increased. A comparison of the figures of total production with those of exports to the countries now engaged in war shows that by far the greater proportion of all naval stores produced has been going to them.

Nearly all our hardwood exports go to Europe, and principally to those countries now engaged in war. In this connection it is interesting that a large part of our walnut—and the very choicest—has been going to the present belligerents, and mainly to Germany, to be made into gun stocks. Here again the South suffers, in commerce if not in production, because New Orleans is the principal source of hardwood exports. Proportionately, the hardwood industry is the hardest hit of all southern lumber, because such a large part of the product depended on the export market. A single example, that of the vast export of oak barrel staves to hold French wine and German beer, is sufficient to indicate what war is doing.

The conditions arising out of difficulties in transportation are only indicated in the foregoing paragraphs, which are intended to be merely suggestive.

PEACE DEMANDS CUT OFF

In countries at war the arts of peace are at a standstill. The building of homes will cease, large projects of con-

struction will be abandoned, and the demands for timber will naturally fall off. England has been experiencing great activity in the building trades. The *Timber Trades Journal*, of London, says, "Of course, the 'boom' in the housebuilding trade will receive a severe check; first, because few will continue to spend money on speculative enterprises of this sort, and secondly . . . the stocks in this country will be insufficient to meet any large demand for building timber. The Government also will scarcely be able to press on with its social programme, and the Housing Bill will either be postponed or abandoned."

Continental business is paralyzed and all sorts of public works have been abandoned.

So, even aside from crippled commerce, the normal demands of peace are at a standstill. Even though all the timber required for military operations might be transported without risk, the quantities used would not begin to compensate for the vast decrease in building and manufacturing in those countries actively at war.

DEPRESSING EFFECTS AT HOME.

All this curtailment of foreign markets, the greatly augmented risks of foreign shipments, and increases in costs of transportation and insurance, mean over-production at home, or an entire cessation of activity such as has already taken place in parts of the south which have been supplying the export trade. The *Southern Lumberman*, while granting that one-tenth of the southern pine cut is exported, says "it is no killing matter even if the whole of these exports be wholly stopped for a few months." But the mills which supply this tenth will take little comfort from the statement, particularly in connection with that "if." All except the most sanguine authorities think the war is quite as likely to be an affair of a year or more, as of a few months. The *Southern Lumberman* journal takes a fairly hopeful view, but much of its hopefulness depends on certain "ifs," which are ever



GERMAN SEEDLINGS FOR EXPORT.

LARGE QUANTITIES OF THESE FOREST SEEDLINGS ARE EXPORTED FROM GERMANY TO THE UNITED STATES AND THE WAR HAS RESULTED IN THE COMPLETE ELIMINATION OF THIS INDUSTRY.

the hinges on which the gate of destiny swings. However, it says that "the best possible thing for the lumber manufacturer to do in every branch of the trade is to reduce production as much as possible without disruption to the business, or the causing of real suffering to their employees."

But the biggest depressing effect at home comes through the general uncertainty, and through the difficulty in

us at the end of a sprint, but at the end of a waiting race, with lots of headwork in it—a veritable Marathon. We have got to plan ahead and to look at all sorts of solutions.

America's neutrality is going to help mightily in the final adjustment. Great Britain's neutrality during the Franco-Prussian war helped her trade increase by leaps and bounds at the expense of the belligerent powers. The countries



BLACK WALNUT GUN STOCKS FOR GERMANY.

IT IS INTERESTING TO NOTE THAT A LARGE PART OF THE BLACK WALNUT CUT IN THE UNITED STATES HAS BEEN GOING TO GERMANY WHERE IT IS USED AS GUN STOCKS.

getting money. This, of course, is a world-wide condition, and affects us no more than it affects other nations. But that does not make the influence on our domestic business any less profound; and any immediate increase in lumber consumption at home is not to be expected.

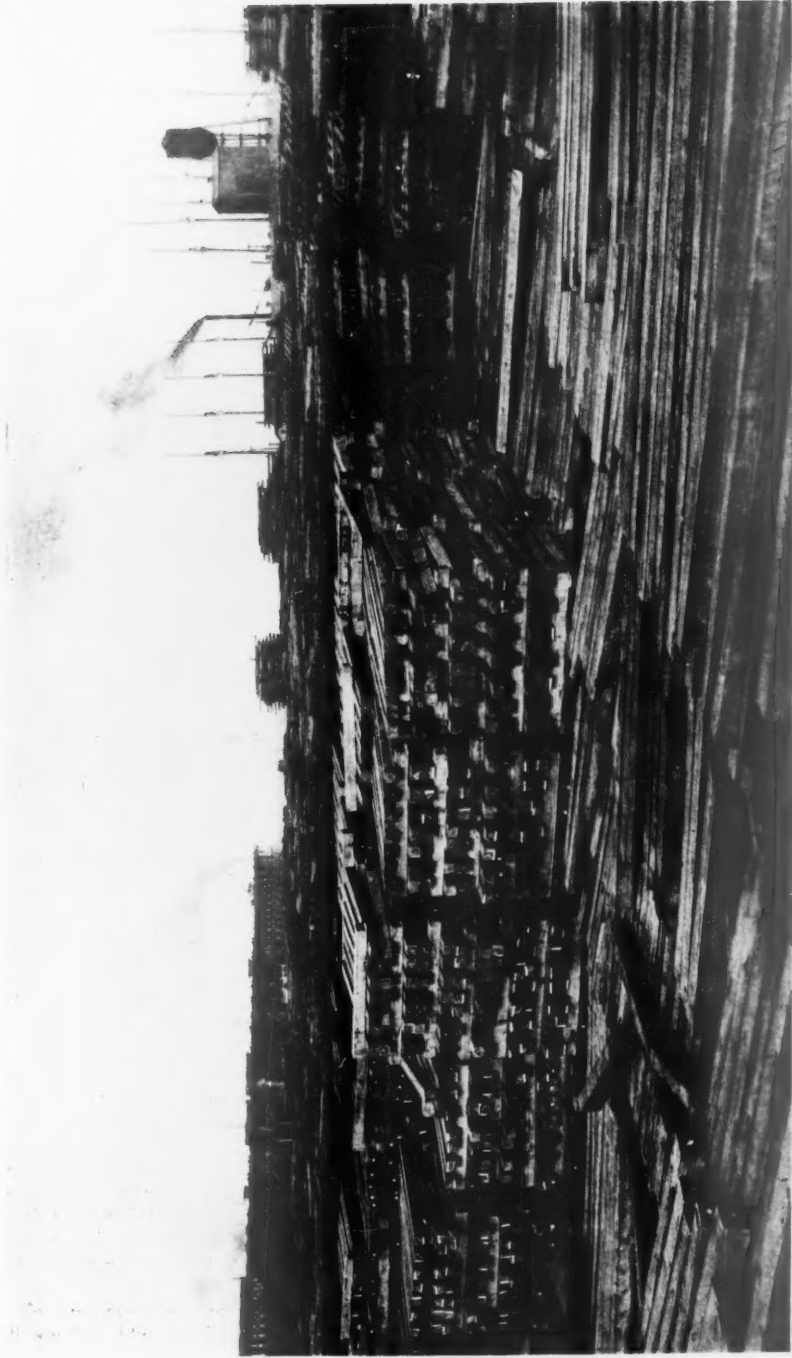
STIMULATING EFFECTS OF WAR.

With characteristic optimism, however, Americans are looking for the stimulus which the European war will bring about. Immediate good effects are not visible; nor are they likely to come soon. The prize is not coming to

now in conflict cannot engage in manufacture and commerce except to supply means of their own subsistence and carrying on their warfare. The United States is having no such devastating effect upon its machinery of production and supply. We are not in the position of keeping hands off simply to benefit our commercial interests, but that fact should not keep us from looking forward to securing such benefits.

NEW OUTLETS FOR TIMBER.

There is little to hope for in the way of war demands for timber from countries now involved in the European



CROSS TIES SEASONING IN A RAILROAD YARD.

MILLIONS OF THESE TIES ARE NOW FILED IN RAILROAD YARDS IN THE UNITED STATES AWAITING PRESERVATIVE TREATMENT AND AS THE SUPPLY OF CREOSOTE OIL FROM GERMANY IS CUT OFF THEY MAY HAVE TO BE USED WITHOUT BEING TREATED. TREATMENT TRIPLES AND QUADRUPLES THEIR LIFE.



SCENE IN A GERMAN FOREST.

AMERICAN FOREST STUDENTS WHO ANNUALLY GO TO GERMANY IN LARGE NUMBERS TO STUDY MODEL FOREST CONDITIONS MAY FIND THE WAR HAS RESULTED IN GREAT DESTRUCTION OF THE FORESTS.

struggle, or indeed in all Europe. It behooves us, then, to look for new outlets. Heretofore Germany has had a large share of the South American trade, particularly with Argentina and Brazil. These countries are still going to need material, and the United States now has an opportunity not only to enter the field, but to cover it.

This subject is worthy of the closest study by all the agencies that can be brought to bear on it, and the lumber industry should take a large share in the study.

The possibility of developing an export trade in mine timbers is indicated by Consul Lorin A. Lathrop, of Cardiff, Wales, who says:

"The coal mines in the South Wales field are timbered with the trunks of 20-year-old fir trees, imported principally from France. So many woodcutters have been withdrawn by French mobilization that there is danger of shortage of the supply. Prices have risen from \$5 to \$7.50 per measured ton, ex-ship, within a week." Consul Lathrop also says that efforts are being made to secure, through official chan-

nels, a release by the French Government of sufficient woodcutters from military and naval service to maintain supplies, but as France is rushing every available man to the front this effort is not at all likely to be successful. This being the case the market is apparently open to the United States.

The war should boom the pulp and paper trade in the United States and Canada and the *Paper Trade Journal*, of New York, in a letter to AMERICAN FORESTRY under date of August 27, is most optimistic, saying:

"There has developed an extraordinary demand for paper of all kinds in the domestic market, and from Europe and South America. Our mills will be taxed to their utmost capacity, and yet will not be able to meet it without further equipment. Every old mill in the country will be requisitioned and fancy prices will prevail. The position of the world's market is indicated by the following cable received by the Trade and Commerce Department of Ottawa, Ontario.

"Large Bordeaux newspaper with daily circulation of 150,000 willing to

purchase \$20,000 print paper, payment conditions determined later. Please obtain quotations, Havre or British port."

"This is a sample of many appeals reaching this market daily. In London it is a case of *paper at any cost*. The United States and Canada are the only available sources of supply, and *paper is not contraband*. Our mills will be obliged to enlarge their equipment to meet the situation."

What seems to be one of the best opportunities for enlarging American outputs is that of supplying the products usually imported. Germany, for example, in the twelve months before July 1, supplied some 150,000,000 pounds of wood pulp, valued at more than two and one-half millions of dollars. This was of kinds we could just as well produce in this country, according to investigations of the Forest Service laboratory at Madison. Norway and Sweden furnished about forty-five million pounds, valued at more than eight millions. Our own mills will have to make up for this, because little of it is likely to come here.

Cabinet woods, except those directly from Central and South America, have come mainly through Great Britain, which shipped to us last year more than one and a half million dollars' worth. We don't grow Circassian walnut, it is true, but we do grow many handsome finishing woods; of these we should

and could use more. Some, of which red gum is a notable example, are growing in popularity and use. Possibly a dearth in the supply of some foreign woods will lead us to consider more carefully the possibilities of our own.

Newspapers have pointed out that Germany normally supplies some twelve million dollars' worth of potash, used as fertilizer, and in the arts, and that this supply will cease, at least for the present. It is mainly a mineral product, but chemists are suggesting that where large quantities of wood ashes are available, as at the waste burners of big sawmill plants, the demand for such a product may make a source of profit from the leached ashes.

Here again, these examples are held out as a few suggestions. Many others, not within the space or scope of this article are possibilities.

On the whole, however, immediate benefits will not accrue to the lumber industry in America as a result of the stupendous and regrettable struggle in Europe. During the continuation of the war there is likely to be marked depression, and the war will not soon cease. But the longer it lasts, the more chance will the lumber business of the country have to make adjustments independent of the European states, and when the peace comes the United States will be in the best position to profit by it.





GERMAN FORESTRY STUDENTS.
A GROUP AT THE UNIVERSITY OF MUNICH, TOGETHER WITH PROF. SCHUPFER, DR. EADRES, AND PROF. FABRICIUS. THE
FORSTMEISTER HAPPAK OF THE KRAMSACH FOREST, STANDS IN THE FRONT ROW, WEARING THE TYPICAL
MOUNTAIN COSTUME.

THE BAVARIAN FORESTER

By G. H. COLLINGWOOD.

[This article was written in Munich, Germany, by Mr. Collingwood, just before the outbreak of the war. Since that time a number of the Bavarian forest employes have joined their commands and have seen some brisk campaigning. Several Bavarian regiments were in the hard fighting in Alsace-Lorraine. The higher forest officials are exempt from military service, except in cases of extreme need. Whether any of them have been called to the front or are now under arms is not known.—EDITOR.]

IN GERMANY the possibility of a Ranger raising through the various stages of the Forest Service to that of Supervisor or District Officer is quite out of the question, for from the very beginning of their education the two officers follow along different courses. To be sure, they may both start in the public school together, but after four years in the Volksschule, as it is known, the future Forstmeister leaves to go into the gymnasium, while the future Ranger, or Förster as he is known in Bavaria, remains three years longer in the Volksschule. He who hopes to be a Forstmeister must first choose parents who

can afford to give him the required education, and help support him for several years after he has secured a position in the government Forest Service. In fact in Prussia there is a law which makes it necessary for a young forest man to have a sufficient income to make him financially independent during the first twelve years after leaving the Academy or University.

The boy who leaves the Volksschule at the end of his fourth year to enter the gymnasium must remain there nine years before finishing. Forestry work, even in Germany, does not require any deep knowledge of Latin and Greek, so

he usually enters the Oberreal gymnasium which corresponds to a rather practical grammar school. Here he receives his mathematics, German literature, botany, drawing, and perhaps English and French. He is then ready to enter the Forestry Hochschule of the University. This word "Hochschule" is rather confusing to the average American, but it corresponds most nearly to a college of a university. But here is the great difference between the German system and ours of America, for in Germany the student is allowed to take one semester's work in one university or academy and one in another, and receive credit for all at the particular place where he wishes to finish. Only in the University of Munich it is required that at least half of the time be spent there. Thus a man who is particularly interested in some special phase of Forestry is able to study under several different professors in as many different institutions, and to receive credit for all of his work.

A middle examination covering chemistry, botany, geology, mathematics and elementary forestry is held at the end of the first two years, and a final at the end of the full course of four years. Upon passing the final examination he is capable of entering the Forest Service as a Praktikant. In Bavaria the Herr Praktikant serves for three years, and during the first year he receives no salary. He is directly under the Forstmeister and is about the forest with him at all times. He becomes thoroughly acquainted with the whole forest,—the trees and plants upon it, and the various systems of managing the different areas. He is often questioned by the Forstmeister as to what he would do with this or that area under certain given conditions.

Naturally, the ideal Forstmeister in a case like this, is something between a tutor and an advisor. During the last two years he is given much work to do,



THE HERR FORSTER AT VALEPP
A TYPE OF THE BAVARIAN RANGER.

either in the office on the various reports, or in the field surveying. During this work he receives about \$1.00 per day.

After his three years as Praktikant he is again subject to an examination, this one continuing for two weeks, and

upon which passing allows him to enter into active work as a Geprüfter Praktikant, beginning at a salary of \$450.00 per year. He occupies this position for two or three years, during which time he does much the same work as he did during the year before taking the examination. He is then raised to the position of Assessor, beginning at \$750.00 per year, and with a possible increase to as high as \$1,500.00. The position of Assessor seems to have a variety of duties. He may be an Assessor in active work, and perhaps be given complete charge of a small area of a thousand or more acres, or he may be an office Assessor where he is more in the nature of an especially trained technical stenographer.

The position of Forstmeister, which corresponds to that of a Supervisor is the next round on the ladder, of promotion, and for many it is the highest. It is seldom that a man reaches this position before the age of 35 or 40 years; he starts in at a salary of \$1,200.00 and progresses to as high as \$1,800.00. A Forstmeister in Bavaria has control of from 10,000 to 50,000 acres, with a force of two or three technical men, and four to ten Försters, depending upon the size of the forest, besides the wood choppers and ordinary laborers who are seldom on for more than six months at a time. Naturally with a force like this upon a comparatively small area, they are able to carry on a very intensive system of Forestry, which at the present time is quite out of the question in America, especially in our big western forests.

About the Forstmeister there are the men in the Ministerium, or Central Office. In Bavaria the Ministerium is in Munich, and each man is known as a Forstund Regierungsrat. They are

chosen from among the most capable of the Forstmeisters, and their work keeps them for the most part in the city, where they receive a salary of from \$1,500.00 to \$2,100.00 per year.

Now, to go back to the time of sep-



UNTRAINED WOODS' WORKERS ON ONE OF THE HIGH MOUNTAIN FORESTS. THESE MEN WORK ONLY DURING THE SUMMER.

aration and segregation at the end of the fourth year in the Volksschule, the young, future Förster follows along a different course of study, and is capable of earning his living at a much earlier age. To be sure, he has no hopes of ever being a Forstund Regierungsrat with a possible salary of \$2,100.00 per year, or even a Forstmeister. The young



A FOREST NURSERY NEAR FREISING, BAVARIA.

BESIDES FURNISHING MOST OF THE MATERIAL NECESSARY FOR PLANTING THE FREISING FOREST, THIS NURSERY CONTAINS A CONSIDERABLE COLLECTION OF AMERICAN SPECIES, WHICH ARE BEING EXPERIMENTED WITH IN GERMANY.

Förster continues in the Volksschule for three years longer, completing his course there. He is then ready to enter the Waldbauschule where he spends four years. In Bavaria there are five of these schools, where the student learns all that is considered necessary for a German Förster. Naturally, in a land where so much planting is done the chief stress is laid upon the silvicultural side, and the preparation and care of nurseries and nursery stock is taught thoroughly. There are, of course, other subjects taught besides Silviculture, and this includes botany, mathematics, and a certain amount of German necessary in the preparation of reports. Somewhere in this period he must serve his two or three years in the army, the length of time depending upon what branch of the service he enters. Those who receive the gymnasium training are partially exempted from military service, and are only required to serve one year.

At the end of his four years in the Waldbauschule he is ready to take an examination which upon passing allows him to enter the State Forest Service as a "Forstschutz-dienstaspirant." This compares most nearly with a guard upon an American forest, only the German is willing to serve under this title for three years at an uncertain salary of little or nothing which varies according to the work in hand. After serving these three years there is another examination waiting for him which makes him eligible to serve as a Forstassistent at \$25.00 per month, and with a possible increase to \$37.50 per month. This position corresponds to that of our Assistant Ranger, and the promotion to Förster or Ranger is based upon merit. The Förster has the work on a District much the same as a Ranger, only with very much less responsibility, and on a much smaller area, for on a forest of 20,000 to 30,000 acres there are usually at least four or



THE FORSTERS' HOUSE AT VALEPP, BEI TEGERN SEE.

THIS IS NOT ONLY A HEADQUARTERS FOR THE RANGER, BUT A WELL MANAGED HOTEL, OR TAVERN AS WELL. THE ORDINARY WORKERS ARE HOUSED IN THE SMALL HOUSE IN THE RIGHT-HAND FOREGROUND.

five Försters. Their work is naturally of a far more intensive nature, but requiring much less physical endurance and judgment than that of the Ranger. It consists chiefly of overseeing a few women in a woods nursery, or out in the forest in some planting operation. To the American who meets a Förster for the first time he is usually a source of considerable surprise. For he often appears as quite dapper in his green suit and white collar, and with usually a feather in his hat. In the high mountain forests he usually wears the picturesque and very practical light jacket, short leather breeches, and woolen quarter socks. Over his shoulder may be slung a shotgun, or combination shotgun and small caliber rifle, and very often he leads a little squatty dachshund which hurries along at his side. But in no case are his hands too full, or his shoulders too heavily laden, for him to take off his hat to the Forstmeister when they meet, and to carry his raincoat and any bundles which he may have. His is a job of supervising others not as fortunate as himself, and of being supervised by the Forstmeister. At the end of several years of faithful service this man may receive the sum

of \$900 per year, and of course if he lives long enough he will receive a pension.

Those who work under the Förster, or the Arbeiter, are not supposed to be educated. They seldom have work for more than six months in the year, although there is usually an agreement of some kind by which they are insured work from year to year. The wood choppers are the best paid, their wages being usually based upon piece work, and at times they earn as high as \$1.50 to \$2.00 per day. They are usually big broad-shouldered peasant boys, who look especially strong and picturesque in their short leather breeches and woolen quarter socks, which leave the heavily muscled knees and ankles tanned and exposed to the weather. Then there are the ordinary workers who are often older men who do the roadwork and lighter work in the woods. These men get from 75 cents to \$1.00 per day. On nearly every forest there are women who do the planting and nursery work, and in the fall go through the forest smearing the tips of the young transplants with a black composition made partially of beef blood, which helps to



HOW ALL OF A TREE IS USED.

A SMALL CUTTING AREA, WHICH HAS OPENED UP A SMALL PART OF THE FOREST, SHOWS THE DISPOSAL OF THE ENTIRE TREE. THIS IS COMPARATIVELY HIGH MOUNTAIN FOREST, CHIEFLY SPRUCE, AT AN ELEVATION OF 2,600 FEET ABOVE SEA LEVEL.

keep the deer from nibbling the tips. In wood's work as in nearly all other work the women must content themselves with less pay, so here it ranges from 60 cents to 75 cents per day. Out of this there are the inevitable German insurance fees to pay. The worker who receives 75 cents to \$1.00 per day must

pay 10 cents per week into a sickness fund, and 2 per cent of his daily wage into an old age and disabled pension fund. If at the end of fifteen years he is disabled he receives \$20.00 per year, at the end of twenty years it is \$40.00, and at the end of thirty years it is \$50.00.



THE WORLD'S GREATEST WOODLOT

By GEORGE S. LONG.

THERE are native to the Pacific slope states about one hundred species of true forest trees, not counting low shrub forms, and of these nearly forty species, or over a third, have established commercial value. From the ordinary lumbering standpoint, about fifteen species are of high importance because of both quantity and quality and perhaps five more are cut when found in mixture with them. The other kinds classed above as commercial are rarer, or used only for special purposes, and do not enter into ordinary lumber stocks.

While a few important species are confined to particular localities, like the redwood of the California coast counties and the Port Orford cedar of southwestern Oregon, others occur wherever climatic conditions suit their peculiar requirements and a third still more adaptable class, like Douglas fir and western yellow pine, range throughout the entire West except upon deserts and mountain tops, although finding certain conditions more favorable to their highest development. For these reasons, and particularly because there are few extensive areas maintaining uniform conditions particularly suited to one, pure stands of any one species are rare. The forests of the west present a succession of varying mixture-types, perhaps dominated in certain regions by one or more species but often shading into another type almost imperceptibly with changing altitude or climate.

The western slope of the Rockies is typically a western yellow pine and Engelmann spruce forest, the spruce succeeding the pine at higher, moister altitudes. The same red or Douglas fir that grows to immense size on the coast is scattered through it, but of small size or value. Alpine members of the white pine family occur but are not commercial. At the foot of the mountains,

making a transition into sage brush, are areas of juniper trees too small to saw but valuable for fuel and posts. Under certain mountain conditions, especially where fire has discouraged the yellow pine, lodgepole pine is abundant, and although little used for lumber, affords ties and mining timbers.

Just as in the southern part of the Rocky Mountain region, in Arizona and New Mexico, western yellow pine predominates (the Flagstaff region in Arizona is said to have the largest absolutely unbroken pine forest now extant in the world), to the northward through Wyoming and into Montana lodgepole pine becomes a more important component of the whole. Utah and southern Idaho are also in this Rocky Mountain type of varying pine and spruce forest of which but one species, western yellow pine, is a thoroughly excellent tree for universal purposes, but which is all valuable for local and special use and as a protector of a great watershed.

Northern Montana and Idaho are unique in being the meeting ground of Rocky Mountain and Pacific coast forest conditions, for wide arid areas prevent such a meeting in the states farther south. Here all the species described above are found, while cedar and hemlock testify approach to the moister climate of the coast. From the lumberman's standpoint, however, it is none of these outposts from either side that make the region interesting but the dominance of the two species that find here their highest development—western white pine and larch, or tamarack. The latter grows on dryer soils, mixed with red fir or yellow pine. The fresher situations bear magnificent stands of white pine, sometimes mixed with valuable pole cedar, and this pine, although a different species to botanists, serves every purpose for which the disappearing eastern white pine is a favorite. Its rapid growth as well as its



A PRIMEVAL FOREST IN OREGON.

A TYPE OF THE NOBLE FIR, HEMLOCK AND RED FIR TO BE FOUND ON THE PACIFIC COAST.



YELLOW PINE.

THIS IS PART OF A FINE STAND IN SOUTHEASTERN WASHINGTON.

value gives the forester a particular interest in this region. The white fir of the coast, much like the eastern balsam, makes its appearance here, also hemlock, and occasionally a paper birch. The highest mountains have several alpine conifers of no commercial value.

Northeastern Washington and the east slope of the Cascades as far south as northern California, being sheltered from the Pacific rain-winds, return somewhat to Rocky Mountain conditions and bear chiefly forests of high quality western yellow pine, invaded more or less by lodgepole where recurring fires prevent yellow pine reproduction and shading into tamarack and fir at higher altitudes. Occasionally the same Engelmann spruce of the Rockies occurs in some numbers. Broad leaved trees, except the ever-present cottonwood and aspen, are lacking as elsewhere in the interior west.

The next distinct type is the famous one associated with the Pacific northwest in the minds of all lumbermen and foresters—the famous fir forests of the rainy region between the Cascade range and the sea. In nearly pure stands or mixed with cedar, hemlock, Sitka spruce, white fir and the other commercial trees in which this region is so rich, fir here reaches what foresters call the optimism of a species—its most perfect development—and this most widely useful of American trees often attains a height of 200 feet, a diameter of 8 to 12 feet, and in favored locations yields more than 75,000 feet, board measure, to the acre. Its frequent companion, western hemlock, is scarcely less magnificent in size or less valuable, being quite different from its eastern namesake. In the mountains these species mix with white pine and with the noble and amabilis firs (sometimes erroneously called larch), both woods of high value although comparatively little known, and in the highest situations is found the handsome cabinet wood, Alaska cedar.

Through this region, the moister localities produce the giant red cedar, two-thirds the nation's cedar supply coming from western Washington and Oregon. Along the coast Sitka or tide-

land spruce the largest and finest of the world's spruces, extends southward till its predominance as a special coast tree is usurped by Port Orford cedar, which in turn gives way to redwood. The Pacific northwest forest also includes, although much more sparingly in quantity and inferior in quality than the eastern hardwood regions, maple, ash, alder, laurel and oak, and the world's supply of the medicinal cascara. Paper mills use its spruce, hemlock, fir and cottonwood for pulp. Its oak is not of the highest value, but useful.

About midway southward through Oregon, the Cascade type changes again, the red fir and western yellow pine persisting but the peculiarly northern trees giving way gradually to sugar pine, incense cedar, Shasta fir, and other less important species, all making up the representative forest of Northern California. Sugar pine, the largest of the American pines and much like white pine in quality—a truly noble tree—is the most valuable. The California foothills also have several local pines of small importance.

The famous California redwood occupies a strip of perhaps thirty miles wide from the Oregon line to Santa Cruz, California, sometimes pure and sometimes containing red and white fir in mixture. The Bigtree, a close cousin, occurs only in a few groves in the southern Sierras. California is rich in oak species, including many beautiful live oaks, but few are of high lumber value. On the other hand the California tan oak, abundant on the coast of southern Oregon and northern California, produces high-grade bark for tanning and often is worth as much per acre as fairly good timber land.

Owing to the infinitely varying mixture of species and the lack of any widespread and uniform attempt to arrive at their proportion through percentage systems, it would be a rash guess even to approximate the available quantity of each of the important commercial species. Even the total is estimated differently by different authorities, not only because of varying information sources, but also because the standard of what is merchantable



THE FAMOUS REDWOOD.
VIEW IN A LARGE FOREST OF RED WOOD NEAR CRESCENT CITY, CALIFORNIA.

NAT. ENG. CO.



REDWOOD LOGGING.

"FALLERS" MAKING THE UNDER CUT. AFTER THIS HAS BEEN DONE AND THE BARK CUT AWAY A SAW IS USED. THIS FOREST IS NEAR CASPAR, MENDOCINO COUNTY, CALIFORNIA.

changes yearly and its future can be only a matter of judgment. We know that before a large part of our forests can be cut it will pay to use smaller and less desirable trees than can be used profitably now, but no one knows how much smaller and less desirable they can be used at the exact time they are reached by the logger of the future.

The most recent estimates of western timber are those of the Department of Commerce and Labor, which place the entire supply in Montana, Idaho, Washington, Oregon and California at 1,512,900,000,000 feet, board measure, or nearly 54 per cent of all the timber in the United States. Of this, 1,013,000,000,000 feet is in private ownership, 440,800,000,000 in National Forests, and 59,100,000,000 in state ownership, military and Indian reservations, unreserved public lands, etc. Less is known of the other western states, but the National Forests alone in Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming are said to contain ninety billion feet. Certainly the entire west has well over one and a half trillion, a figure hard to grasp by the layman unless by reflecting that the present cut of lumber in the entire United States is only about forty billion a year. This means that the five great forest states first mentioned could, without assistance and without any new growth, equal the entire nation's present lumber production for nearly forty years.

Fully one-third of this stand of timber is owned and controlled by the Federal Government and the states west of the Rocky Mountains, and in this, the World's Greatest Wood Lot, there is an united, harmonious and effective effort on the part of the Federal Forest Service, the Forestry Department of

the states and private owners to safeguard and protect this timber from its greatest enemy—forest fire.

Here also is a public sentiment alert, advanced and willing to put in practice all intelligent conservation demands, that is possible under present economic conditions.

Aside from the hardwoods, the tim-



RED FIR AND WESTERN HEMLOCK.

THIS IS A TYPICAL MIXTURE OF THESE FINE TREES IN THE BLACK HILLS, WASHINGTON.

ber suitable for lumber in the Pacific Northwest, is unsurpassed in variety, quality and adaptability for the ordinary uses to which wood products are used. The predominating wood—Fir—being undoubtedly without a rival for structural purposes, and boldly challenging all other soft woods for the beauty of its higher grades in finish.

Supplementing the Fir, are the Cedar



FOREST SCENE IN WASHINGTON.

THOUSANDS UPON THOUSANDS OF ACRES ARE COVERED WITH SUCH TREES AS THESE.

and Redwood, almost impervious to decay, and while lacking in structural strength, supply in shingles, beveled siding and exterior finish, a wood unequaled for length of life. The Spruce of the Coast region, unlike its type on the Atlantic Coast, is a giant tree, yielding a large percentage of clear lumber of great merit.

The White Pine of Idaho, in its quality, easily maintains the dignity and merit of the White Pine of Michigan, Wisconsin and Minnesota, while the so-called Western Yellow Pine, in greater abundance, is a worthy substitute for White Pine, for interior finish, box material and for ordinary structural work, while Sugar Pine, less abundant than any of the leading species, has all the merit of White Pine.

The forests of the Pacific Northwest, therefore, are notable not only because they contain more than 50 per cent of the standing timber in the United States, but also because this timber will yield a better quality of building material than has heretofore been supplied by the forests east of the Rocky Mountains.

CLASSIFICATION OF THE 100 TREES.

The most important of the trees in this world's greatest woodlot are:

Western White Pine, Sugar Pine, Western Yellow Pine, Lodgepole Pine,

Western Larch (Tamarack), Engelmann Spruce, Sitka Spruce, White Spruce, Western Hemlock, Red or Douglas Fir, Noble Fir, Redwood, Incense Cedar, Red Cedar, Port Orford Cedar.

The trees cut in mixture with the most important ones are:

Tamarack, White Fir (two species), Amabilis Fir, Shasta or Red Fir.

The trees of minor, local or special importance, and their particular uses are:

Bigtree, lumber; Alaska Cedar, finishing; Juniper (four species), posts; Alder (two species), furniture and finishing; California Laurel, cabinet and finishing; Aspen, fruit boxes; Cottonwood, boxing, pulp, etc.; Balm of Gilead, boxing, pulp, etc.; Broadleaf Maple, furniture and flooring; Cascara, medicinal; Oregon Ash, general hardwood uses; Yew, bows, paddles, etc.; Dogwood, turnery; Oak (several species), tanning and general hardwood purposes.

The non-commercial trees are: Over a dozen pines; small Alpine larches, spruces, hemlocks, firs, rare or small birches, alders, cottonwoods, maples, etc., numerous inferior oaks, sycamores, walnuts, etc. Probably sixty or more in all, some valuable in quality but too rare to consider, others common but useful only for fuel.



NATIONAL FORESTS AS RECREATION GROUNDS

By PROF. W. J. MORRILL,

Forestry Department, University of Nebraska.

A SCORE of Switzerlands in western America are inviting us to "see America first."

The National Forests of the West offer scenery equally as varied and attractive as the Alps, though different, a more delightful climate, mineral and hot springs of as much efficacy as the most celebrated ones abroad, and greater opportunities for sport.

These Forests are within a country populous with mountains. Tier rises above tier, buttressed with mighty lateral spurs, dominated by splendid peaks.

cut by beautiful, cliff-walled valleys, divided by broad plateaus. Hundreds of towering, snow-clad shafts pierce the azure sky to elevations far exceeding the highest mountains of Eastern United States.

Thousands of mountain streams well stocked with speckled trout rise within these mountain fastnesses, where the Big Horn stands sentinel on commanding pinacles, and where the mountain lion, wary of man, still takes his toll of deer, as for ages past. The spruce forests even yet hold within their shady



CAMP MARTIN, ANGELES NATIONAL FOREST, CALIFORNIA.

AN IDEAL SPOT HIGH IN THE MOUNTAINS WHICH IS A FAVORITE RESORT FOR MANY CALIFORNIANS.



A SUMMER COTTAGE.

THIS IS ONE OF SEVERAL SUCH COTTAGES BUILT IN 1911, ALONG THE WATER FRONT OF PELUAN BAY, SOUTH OF ROCKY POINT ON THE CRATER NATIONAL FOREST, OREGON, UNDER THE SPECIAL USE PERMIT.

and silent depths the alluring sense of mystery and adventure, and the open, grass-floored groves of pine seem to say "tarry here." In the alpine pastures the tinkle of the bell on the "bell wether" floats dreamily across the mountain encircled basin, or the sharp, eager bark of the herder's collie is heard punctuating the protesting bleating of the sheep as this faithful guardian intelligently and undirected forces straying lambs back to the flock.

In the lower valleys or in some grassy park surrounded by forest, perhaps a herd of cattle may be seen grazing contentedly or filing solemnly away, impelled by a contagious impulse, to a watering place well known to them alone. Every turn in the winding road,

or, may be, trail presents a panorama of new and absorbing interest; in the foreground the dancing stream, boulder strewn, and marked at intervals with deep-edging pools, seems to challenge ones piscatorial skill, or else arouses more esthetic thoughts. In the distant background a fleeting glimpse through a vista of mighty fire presents in a setting of great beauty some snow-clad peak tinted with cloud reflections. In the mountain valleys the days are mild and sunny; the nights, delightfully cool, and the bracing air fortifies the visitor.

These wild regions are being used for recreation grounds to an increasing extent. It is estimated that a few years ago, when a count was attempted, half a million people paid homage to



A SUMMER CAMP.

AN IDEALLY SITUATED CAMP AMONG THE FINE TREES ON THE CRATER NATIONAL FOREST, OREGON, NEAR BROWN'S CABIN. THE CAMPING EQUIPMENT WAS TAKEN ON THE WAGON.

the attractions so lavishly afforded. Of this number no less than 100,000 visited points of interest within the Pike National Forest, in Colorado; 21,000, it is said, entered the Coconino Forest in Arizona, mostly to see the Grand Canyon within the boundaries of that Forest; 50,000 people visited the Angeles Forest; and 20,000 enjoyed the fishing, boating, camping and scenery within the Tahoe Forest, the latter two being in California, while lesser numbers found varied recreation in each of more than 40 other Forests.

It is the purpose of the National Forests to place all their resources to their highest use. Scenery is a resource, and often one that can be marred. A mountain side swept by fire leaves only the unsightly skeleton of its former glory and becomes a distressing spectacle. The streams, moreover, arising on a fire denuded water shed become erratic;

devasting floods carve away their banks and strew the narrow valley bottoms with sand and boulders, only to be quickly followed by periods of unusually low flow; good fishing declines, and the attractiveness of the country affected is impaired in every way.

While summer hotels with accommodations for the most fastidious may be found at rare intervals throughout this vast, mountainous region, the whole country is open to those who enjoy genuine camping in a country brimful of interest, grand scenery, and good sport. It appeals especially to the red-blooded American who delights in pitching his tent under the trees on the bank of some swift, clear trout stream lined with picturesque crags amid wild mountains, where the swirl of the racing waters lull him to sleep after a day crowded with interest and activity.



SKUNK CREEK CAMP.

THIS IS ON THE KANIKSU NATIONAL FOREST IDAHO, AND POSITIVELY THE ONLY THING UNPLEASANT ABOUT IT IS ITS NAME.



A FAVORITE SUMMER RESORT.

THIS IS A VACATION SPOT AT ROCKY POINT, ON RECREATION CREEK NEAR PELICAN BAY ON THE CRATER NATIONAL FOREST, OREGON, AND IS OPERATED UNDER THE SPECIAL USE PROVISION.



LAUNCH ON KLAMATH LAKE.

THE CRATER NATIONAL FOREST, OREGON, FRONTS FOR A CONSIDERABLE DISTANCE ON THIS LAKE WHICH IS A DELIGHTFUL PLACE FOR SUMMER PLEASURE.

Over all this enchanted isolation and remoteness the strong protective arm of the Government is thrown, quietly and unobtrusively. The trails one uses have been, quite likely, built at government expense, primarily to enable the Forest Ranger to patrol the extensive forests for fire protection. To him you are indebted for the guide signs at forks for trails and for the posted information concerning distances and directions to choice camping sites. Perhaps he rides to your camp. If so, you will find him thoroughly competent and willing to direct you to the chief points of interest in the vicinity. He wars against the predatory animals in order to protect the deer, elk, and mountain sheep, as well as the domestic stock, and he keeps the streams stocked with trout. Incidentally, he is also a game warden.

Many roads and bridges are built or

repaired by him and miles of telephone lines are strung to further protect the great stands of timber which clothe the mountain sides and add to the charms of the region. The Forest officer is proud of his district; he welcomes visitors, but courteously insists on the proper use of the resources. Without him deterioration of much that is attractive to the tourist would occur. In reality this tendency appeared before his advent. While the primary purpose of the National Forests is the conservation of the timber and water resources within them, in conjunction with his duties, and often directly attributable to them, the Forest officer becomes the guardian or custodian of the greatest national playgrounds. The attractions are here; they may be fully enjoyed; and the popularity of the National Forests as recreation grounds is rapidly increasing.

THE GLACIERS OF MT. RAINIER

By F. E. MATTHES, *United States Geological Survey.*

THE impression still prevails in many quarters that true glaciers, such as are found in the Swiss Alps, do not exist within the confines of the United States, and that to behold one of these rare scenic features one must go to Switzerland, or else to the less accessible Canadian Rockies or the inhospitable Alaskan coast. As a matter of fact, permanent bodies of snow and ice, large enough to deserve the name of glaciers, occur on many of our western mountain chains, notably in the Rocky Mountains, where only recently a national reservation—Glacier National Park—was named for its ice fields; in the Sierra Nevada of California, and farther north, in the Cascade Range. It is on the last-named mountain chain that glaciers especially abound, clustering as a rule in groups about the higher summits of the crest. But this range also supports a series of huge, extinct volcanoes that tower high above its sky line in the form of isolated cones. On these the snows lie deepest and the glaciers reach their grandest development. Ice clad from head to foot the year round, these giant peaks have become known the country over as the noblest landmarks of the Pacific Northwest. Foremost among them are Mount Shasta, in California (14,162 feet); Mount Hood, in Oregon (11,225 feet); Mount St. Helens (9,697 feet), Mount Adams (12,307 feet), Mount Rainier (14,408 feet), and Mount Baker (10,730 feet), in the State of Washington.

Easily king of all is Mount Rainier. Almost 250 feet higher than Mount Shasta, its nearest rival in grandeur and in mass, it is overwhelmingly impressive, both the vastness of its glacial mantle and by the striking sculpture of its cliffs. The total area of its glaciers amounts to no less than 45 square miles, an expanse of ice far exceeding that of any other single peak in the United States. Many of its individual ice streams are

between 4 and 6 miles long and vie in magnitude and in splendor with the most boasted glaciers of the Alps. Cascading from the summit in all directions, they radiate like the arms of a great starfish. All reach down to the foot of the mountain and some advance considerably beyond.

As for the plea that these glaciers lie in a scarcely opened, out-of-the-way region, a forbidding wilderness as compared with maturely civilized Switzerland, it no longer has the force it once possessed. Rainier's ice fields can now be reached from Seattle or Tacoma, the two principal cities of western Washington, in a comfortable day's journeying, either by rail or by automobile. The cooling sight of crevassed glaciers and the exhilarating flower-scented air of alpine meadows need no longer be exclusive pleasures, to be gained only by a trip abroad.

Mount Rainier stands on the west edge of the Cascade Range, overlooking the lowlands that stretch to Puget Sound. Seen from Seattle or Tacoma, 60 and 50 miles distant, respectively, it appears to rise directly from sea level, so insignificant seem the ridges about its base. Yet these ridges themselves are of no mean height. They rise 3,000 to 4,000 feet above the valleys that cut through them, and their crests average 6,000 feet in altitude. From the top of the volcano one fairly looks down upon the Tatoosh Range, to the south; upon Mount Waw, to the southwest; upon the Mother Mountains, to the northwest, indeed, upon all the ridges of the Cascade Range. Only Mount Adams, Mount St. Helens, and Mount Hood loom like solitary peaks above the even sky line, while the ridges below this line seem to melt together in one vast, continuous mountain platform. And such a platform, indeed, one should conceive the Cascade Range once to have been. Only it is now thoroughly dissected by profound, ramifying valleys, and has



THE KAUTZ GLACIER.

THIS IS A SNAKE-LIKE ICE STREAM ABOUT 1,000 FEET WIDE BUT ATTAINING A LENGTH OF FOUR MILES.

been resolved into a sea of wavelike crests and peaks.

Mount Rainier stands, in round numbers, 10,000 feet high above its immediate base, and covers 100 square miles of territory, or one-third of the area of Mount Rainier National Park. In shape it is not a simple cone tapering to a slender, pointed summit like Fuji Yama, the great volcano of Japan. It is, rather, a broadly truncated mass resembling an enormous tree stump with spreading base and irregularly broken top. Its life history has been a varied one. Like all volcanoes, Ranier has built up its cone with materials ejected

cinder cones. Successive feeble eruptions added to their height until at last they formed together a low, rounded dome—the eminence that now constitutes the mountain's summit. It rises only about 400 feet above the rim of the old crater, and is an inconspicuous feature, not readily identifiable from all sides as the highest point. In fact, so broad is the mountain's crown that from no point at its base can one see the top. The higher portions of the old crater rim, moreover, rise to elevations within a few hundred feet of the summit, and, especially when viewed from below, stand out boldly as separate peaks that



Photo by Matthes.

THE TATOOSH RANGE, FROM PARADISE GLACIER.

by its own eruptions—with cinders and bombs (steam-shredded particles and lumps of lava), and with occasional flows of liquid lava that have solidified into layers of hard, basaltic rock. At one time it attained an altitude of not less than 16,000 feet, if one may judge by the steep inclination of the lava and cinder layers visible in its flanks. Then a great explosion followed that destroyed the top part of the mountain, and reduced its height by some 2,000 feet. The volcano was left beheaded, and with a capacious hollow crater, surrounded by a jagged rim.

Later on this great cavity, which measured nearly 3 miles across, from south to north, was filled by two small

mask and seem to overshadow the central dome. Especially prominent are Peak Success (14,150 feet) on the southwest side, and Liberty Cap (14,112 feet) on the northwest side.

The altitude of the main summit has for many years been in doubt. Several figures have been announced from time to time, no two of them in agreement with each other; but all of these, it is to be observed, were obtained by more or less approximate methods. In 1913 the United States Geological Survey, in connection with its topographic surveys of the Mount Rainier National Park, was able to make a new series of measurements by triangulation methods at close range. These give the peak an



Photo by Curtis.

THE NISQUALLY GLACIER.

A GENERAL VIEW FROM THE HEIGHTS OF PARADISE PARK. THE SQUARE CUT ROCK MASS TO THE RIGHT OF THE SUMMIT IS GIBRALTAR ROCK, THE CHIEF OBSTACLE IN THE ASCENT OF THE PEAK.

elevation of 14,408 feet, thus placing it near the top of the list of high summits of the United States. Greater exactness of determination is scarcely practicable in the case of Mount Rainier, as its highest summit consists actually of a mound of snow the height of which naturally varies somewhat with the seasons and from year to year.

This crowning snow mound, which was once supposed to be the highest point in the United States, still bears the

proud name of Columbia Crest. It is essentially a huge snowdrift or snow dune heaped up by the westerly winds. Driving furiously up through the great breach in the west flank of the mountain, between Peak Success and Liberty Cap, they eddy lightly as they shoot over the summit and there deposit their load of snow.

The drift is situated at the point where the rims of the two summit craters touch, and represents the only

permanent snow mass on these rims, for some of the internal heat of the volcano still remains and suffices to keep these rock-crowned curving ridges bare of snow the better part of the year. It is intense enough, even, to produce numerous steam jets along the inner face of the rim of the east crater, which appears to be the most recently formed of the two. The center of this depression, however, is filled with snow, so that it has the appearance of a shallow, white-floored bowl some 1,200 feet in diameter. Great caverns are melted out by the steam jets under the edges of the snow mass, and these caverns afford shelters which, though uninviting, are not to be despised. They have proved a blessing to more than one party that has found itself compelled to remain overnight, on the summit, saving them from death in the icy gales.

That Mount Rainier should still retain so much of its internal heat is not surprising in view of the recency of its eruptions. It is known to have been active at intervals during the last century, and actual record exists of slight eruptions in 1843, 1854, 1858, and 1870. Indian legends mention a great cataclysmal outburst at an earlier period.

At present the volcano may be regarded as dormant and no apprehension need be felt as to the possibility of an early renewal of its activity.

In spite of Mount Rainier's continued activity until within the memory of man, its sides appear to have been snow clad for a considerable length of time. Indeed, so intense and so long-continued has been the eroding action of the ice that the cone is now deeply ice-scarred and furrowed. Most of its outer layers, in fact, appear already to have been stripped away.

From the rim points downward the ice cover of the cone divides into a number of distinct stream-like tongues or glaciers, each sunk in a great hollow pathway of its own. Between these ice-worn trenches the uneroded portions of the cone stand out in high relief, forming as a rule huge triangular "wedges," heading at the sharp rim points and spreading thence downward

to the mountain's base. There they assume the aspect of more gently sloping, grassy table-lands, the charming alpine meadows of which Paradise Park and Spray Park are the most famous. Separating these upland parks are the profound ice-cut canyons which, beyond the glacier ends, widen out into densely forested valleys, each containing a swift-flowing river. No less than a dozen of these ice-fed torrents radiate from the volcano in all directions, while numerous lesser streams course from the snow fields between the glaciers.

Thus the cone of Mount Rainier is seen to be dissected from its summit to its foot. Sculptured by its own glacier mantle, its slopes have become diversified with a fretwork of ridges, peaks and canyons.

NISQUALLY GLACIER.

The first ice one meets on approaching the mountain from Longmire Springs lies in the upper end of the Nisqually Valley. The wagon road, which up to this point follows the west side of the valley, winding in loops and curves along the heavily wooded mountain flank, here ventures out upon the rough boulder bed of the Nisqually River and crosses the foaming torrent on a picturesque wooden bridge. A scant thousand feet above this structure, blocking the valley to a height of some 400 feet, looms a huge shapeless pile of what seems at first sight only rock débris, gray and chocolate in color. It is the dirt-stained end of one of the largest glaciers—the Nisqually. From a yawning cave in its front issues the Nisqually stream, a river full fledged from the start.

The altitude here, it should be noted, is a trifle under 4,000 feet; hence the ice in view lies more than 10,000 feet below the summit of the mountain, the place of its origin. And in this statement is strikingly summed up the whole nature and economy of a glacier such as the Nisqually.

A glacier is not a mere stationary blanket of snow and ice clinging inert to the mountain flank. It is a slowly moving streamlike body that descends by virtue of its own weight. The upper

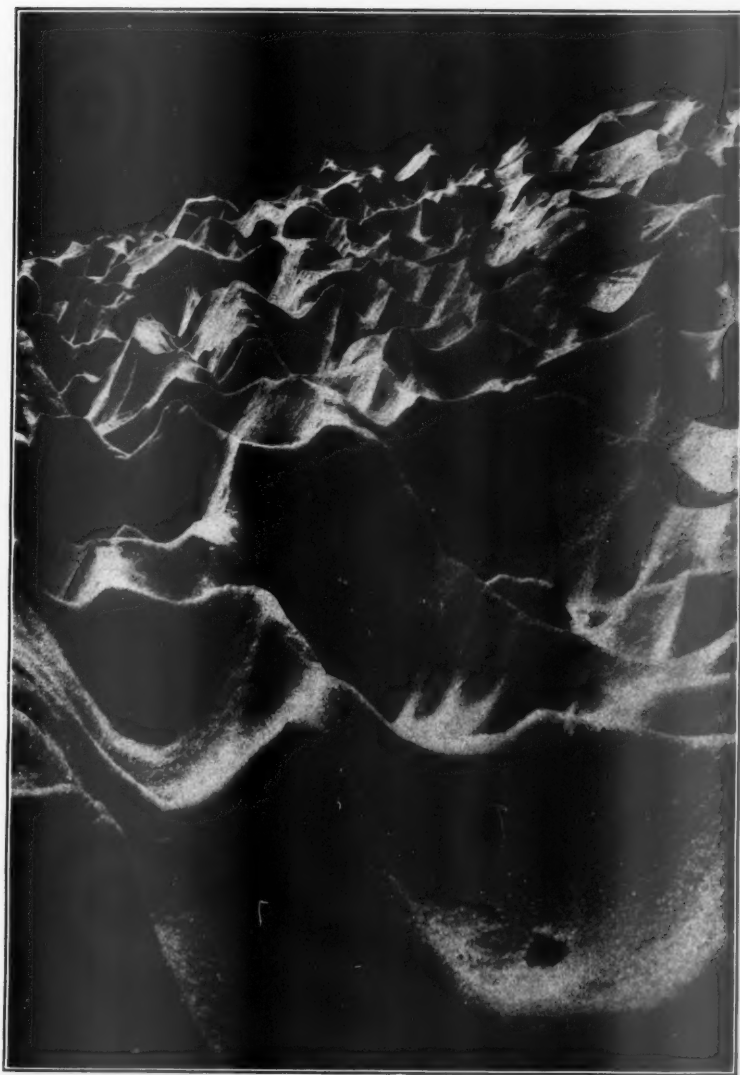


Photo by G. K. Gilbert.

SNOW CUPS AND "HONEYCOMBS."

THESE ARE PRODUCED IN A HIGH NEVE FIELD BY THE HOT RAYS OF THE SUN. THE AIR AT THESE HEIGHTS REMAINS ALMOST CONSTANTLY BELOW THE FREEZING POINT.

parts are continually being replenished by fresh snowfalls, which at those high altitudes do not entirely melt away in summer; while the lower end, projecting as it does below the snow line, loses annually more by melting than it received by precipitation, and is maintained only by the continued accession of masses from above. The rate at which the ice advances has been determined by Prof. J. N. Le Conte, of the University of California. In 1903 he placed a row of stakes across the glacier, and with the aid of surveying instruments obtained accurate measurements of the distances through which they moved from day to day. He found that in summer, when the movement is greatest, it averages 16 inches per day. This figure, however, applies only to the central portion of the glacier—the main current, so to speak—for the margins necessarily move more slowly, being retarded by friction against the channel sides.

As one continues the ascent by the wagon road a partial view of the glacier's lower course is obtained, and there is gained some idea of its stream-like character. More satisfying are the views from Paradise Park. Here several miles of the ice stream (its total length is nearly 5 miles) lie stretched out at one's feet, while looking up toward the mountain one beholds the tributary ice fields and ice streams, pouring, as it were, from above, from right and left, rent by innumerable crevasses and resembling foaming cascades suddenly crystallized in place. The turmoil of these upper branches may be too confusing to be studied with profit, but the more placid lower course presents a favorable field for observation, and a readily accessible one at that.

A veritable frozen river it seems, flowing between smooth, parallel banks, half a mile apart. Its surface, in contrast to the glistening ice cascades above, has the prevailingly somber tint of old ice, relieved here and there by bright patches of last winter's snow. These lie for the most part in gaping fissures or crevasses that run athwart the glacier at short intervals and divide its body into narrow slices. In the upper

course, where the glacier overrides obstacles in its bed, the crevasses are particularly numerous and irregularly spaced, sometimes occurring in two sets intersecting at right angles, and producing square-cut prisms. Farther down the ice stream's current is more sluggish and the crevasses heal up by degrees, providing a united surface, over which one may travel freely.

SNOWCUPS AND HONEYCOMBS.

At the high altitudes the sun heat is astonishingly intense, as more than one uninitiated mountain climber has learned to his sorrow by neglecting to take the customary precaution of blacking his face before making the ascent. In a few hours the skin is literally scorched and begins to blister painfully.

At the foot of the mountain the sun heat is relatively feeble, for much of it is absorbed by the dust and vapor in the lower layers of the atmosphere, but on the summit, which projects 2 miles higher, the air is thin and pure, and lets the rays pass through but little diminished in strength.

The manner in which the sun affects the snow is peculiar and distinctive. Instead of reducing the surface evenly, it melts out many close-set cups and hollows, a foot or more in diameter and separated by sharp spires and crests. No water is visible anywhere, either in rills or in pools, evaporation keeping pace with the reduction. If the sun's action is permitted to continue uninterrupted for many days, as may happen in a hot, dry summer, these snow cups deepen by degrees, until at length they assume the aspect of gigantic bee cells, several feet in depth. Snow fields thus honeycombed may be met with on the slopes above Gibraltar Rock. They are wearisome to traverse, for the ridges and spines are fairly resistant, so that one must laboriously clamber over them. Most exasperating however, is the going after a snowstorm has filled the honeycombs. Then the traveler, waist deep in mealy snow, is left to flounder haphazard through a hidden labyrinth.

Of interest in this connection is the great snow cliff immediately west of

Gibraltar Rock. Viewed from the foot of that promontory, the sky line of the snow castle fairly bristles with honeycomb spines; while below, in the face of the snow cliff, dark, wavy lines, roughly parallel to the upper surface, repeat its pattern in subdued form. They represent the honeycombs of previous seasons, now buried under many feet of snow, but still traceable by the dust that was imprisoned with them.

tribution of the glaciers on the cone. By far the greater number originate in the vicinity of the 10,000-foot level, while those ice streams which cascade from the summit, such as the Nisqually are in a sense reborn some 4,000 feet lower down.

PARADISE GLACIER.

A striking example of an ice body nourished wholly by the snows falling on the lower slope of Mount Rainier is



Photo by Curtis.

GENERAL VIEW OF PARADISE GLACIER.

THE ICE BODY ORIGINATES ENTIRELY BELOW THE 9,000-FOOT LINE. MORE SNOW FALLS AT THESE RELATIVELY LOW LEVELS THAN ON THE SUMMIT OF THE PEAK.

It is between the 8,000 and 10,000 foot levels, that one meets with the conditions most favorable for the development of glaciers. Below this zone the summer heat largely offsets the heavy precipitation, while above it the snowfall itself is relatively scant. Within the belt the annual addition of snow to the ice fields is greater than anywhere else on Mount Rainier. The result is manifest in the arrangement and dis-

tribution of the glaciers on the cone. In no wise connected with the summit névés, it makes its start at an elevation of less than 9,000 feet. Situated on the spreading slope between the diverging canyons of the Nisqually on the west and of the Cowlitz on the northeast, it constitutes a typical "interglacier," as intermediate ice bodies of this kind are termed.

Its appearance is that of a gently undulating ice field, crevassed only toward

its lower edge and remarkably clean throughout. No débris-shedding cliffs rise anywhere along its borders, and this fact, no doubt, largely explains its freedom from morainal accumulations.

The absence of cliffs also implies a lack of protecting shade. Practically the entire expanse of the glacier lies exposed to the full glare of the sun. As a consequence its losses by melting are very heavy, and a single hot summer may visibly diminish the glacier's bulk. Nevertheless it seems to hold its own as well as any other glacier on Mount Rainier, and this ability to recuperate finds its explanation in the exceeding abundance of fresh snows that replenish it every winter.

The Paradise Glacier, however, is not the product wholly of direct precipitation from the clouds. Much of its mass is supplied by the wind, and accumulates in the lee of the high ridge to the west, over which the route to Camp Muir and Gibraltar Rock is laid. The westerly gales keep this ridge almost bare of snow, permitting only a few drifts to lodge in sheltered depressions. But east of the ridge there are great eddies in which the snow forms long, smooth slopes that descend several hundred feet to the main body of the glacier. These slopes are particularly inviting to tourists for the delightful "glissades" which they afford. Sitting down on the hard snow at the head of such a slope, one may indulge in an exhilarating glide of amazing swiftness, landing at last safely on the level snows beneath.

In the early part of summer the Paradise Glacier has the appearance of a vast, unbroken snow field, blazing, immaculate, in the sun. But later, as

the fresh snows melt away from its surface, grayish patches of old crystalline ice develop in places, more especially toward the glacier's lower margin. Day by day these patches expand until, by the end of August, most of the lower



Photo by Matthes.

HEAD OF COWLITZ GLACIER.

GIBRALTAR ROCK IS SEEN ENDWISE, AT THE APEX OF THE TWO ROCK "CLEAVERS."

ice field has been stripped of its brilliant mantle. Its countenance, once bright and serene, now assumes a grim expression and becomes crisscrossed by a thousand seams, like the visage of an aged man.

Over this roughened surface trickle

countless tiny rills which, uniting, form swift rivulets and torrents, indeed veritable river systems on a miniature scale that testify with eloquence to the rapidity with which the sun consumes the snow.

COWLITZ GLACIER.

Immediately adjoining the the Paradise Glacier on the northeast, and not separated from it by any definite barrier, lies the Cowlitz Glacier, one of the stateliest ice streams of Mount Rainier. It flows in a southeasterly direction, and burrows its nose deeply into the forest-covered hills at the mountain's foot. Its upper course consists of two parallel-flowing ice streams, intrenched in profound troughs, which they have enlarged laterally until now only a narrow, ragged crest of rock remains between them, resembling a partition a thousand feet in height. At the upper end of this crest stands Gibraltar Rock.

At the point of confluence of the two branches there begins a long medial moraine that stretches like a black tape the whole length of the lower course. To judge by its position midway on the glacier's back, the two tributaries must be very nearly equal in strength, yet, when traced to their sources they are found to originate in widely different ways. The north branch, named Ingraham Glacier (after Maj. E. S. Ingraham, one of Rainier's foremost pioneers), comes from the névés on the summit; while the south branch heads in a pocket immediately under Gibraltar. No snow comes to it from the summit; hence we can not escape the conclusion that it receives through direct precipitation and through wind drifting about as much snow as its sister branch re-

ceives from the summit regions. Like the glacier troughs below, the pocket appears to have widened laterally under the influence of the ice, and is now separated from the Nisqually ice fields to the west by only a narrow rock



Photo by Matthes.

CASCADES OF INGRAHAM GLACIER.

IN THE BACKGROUND LITTLE TAHOMA (11,117 FEET), A REMNANT OF THE OUTER LAYERS OF THE VOLCANO, NOW MOSTLY STRIPPED AWAY BY THE ICE.

partition, the Cowlitz Cleaver, as it is locally called. Up this narrow crest the route to Gibraltar Rock ascends. The name "cleaver," it may be said in passing, is most apt for the designation of a narrow rock crest of this sort, and well deserves to be more generally used

in the place of awkward foreign terms, such as *arrete* and *grat*.

Both branches of the Cowlitz Glacier cascade steeply immediately above their confluence, but the lower glacier has a gentle gradient and a fairly uneventful course. Like the lower Nisqually, it is bordered by long morainal ridges, and toward its end acquires broad marginal dirt bands. For nearly a mile these continue, leaving a gradually narrowing lane of clear ice between them. Then they coalesce and the whole ice body becomes strewn with rock *débris*.

The Cowlitz Glacier, including its north branch, the Ingraham Glacier, measures slightly over 6 miles in length. Throughout that distance the ice stream lies sunk in a steep-walled canyon of its own carving. Imposing cliffs of columnar basalt, ribbed as if draped in corduroy, overlook its lower course. Slender waterfalls glide down their precipitous fronts, like silver threads, guided by the basalt flutings.

OHANAPECOSH AND FRYINGPAN GLACIERS

High above the Ingraham Glacier towers that sharp, residual mass of lava strata known as Little Tahoma (11,117 feet), the highest outstanding eminence on the flank of Mount Rainier. It forms a gigantic "wedge" that divides the Ingraham from the Emmons Glacier to the north. So extensive is this wedge that it carries on its back several large ice fields and interglaciers, some of which, lying far from the beaten path of the tourist, are as yet unnamed. Separating them from each other are various attenuated, pinnaled crests, all of them subordinate to a main backbone that runs eastward some 6 miles and terminates in the Cowlitz Chimneys (7,607 feet), a group of tall, rock towers that dominate the landscape on the east side of Mount Rainier.

Most of the ice fields, naturally, lie on the shady north slope of the main backbone; in fact, a series of them extends as far east as the Cowlitz Chimneys. One of the lesser crests, however, that running southeastward to the upland region known as Cowlitz Park, also gives protection to an ice

body of some magnitude, the Ohanapecosh Glacier. Considerably broader than it is long in the direction of its flow, this glacier lies on a high shelf a mile and a half across, whence it cascades down into the head of a walled-in canyon. Formerly, no doubt, it more than filled this canyon, but now it sends down only a shrunken lobe. The stream that issues from it, the Ohanapecosh River, is really the main prong and head of the Cowlitz River.

The largest and most elevated of the ice fields east of Little Tahoma is known for its peculiar shape as Fryingpan Glacier. It covers fully 3 square miles of ground and constitutes the most extensive and most beautiful interglacier on Mount Rainier. It originates in the hollow east side of Little Tahoma itself and descends rapidly northward, overlooking the great Emmons Glacier and finally reaching down almost to its level. It is not a long time since the two ice bodies were confluent.

Below the Fryingpan Glacier there lies a region of charming flower-dotted meadows named Summerland, a most attractive spot for camping.

EMMONS GLACIER.¹

Cloaking almost the entire east side of Mount Rainier is the Emmons Glacier, the most extensive ice stream on the peak (named after Samuel F. Emmons, the geologist and mountaineer who was the second to conquer the peak in 1870.) About $5\frac{1}{2}$ miles long and $1\frac{3}{4}$ miles wide in its upper half, it covers almost 8 square miles of territory. It makes a continuous descent from the summit to the base, the rim of the old crater having almost completely broken down under its heavy *névé* cascades. But two small remnants of the rim still protrude through the ice and divide it into three cascades. From each of these dark rock islands trails a long medial moraine that extends in an ever-broadening band down to the foot of the glacier.

The Emmons Glacier, like the Nisqually and the Cowlitz, becomes densely littered with morainal *débris* at its lower end, maintaining, however, for a con-

¹ This glacier is also known locally as White Glacier.



Photo by Curtis.

LOOKING SOUTH FROM THE "WEDGE" ACROSS THE ENTIRE WIDTH OF EDMONS GLACIER. IN THE DISTANCE ARE LITTLE
TAHOMA, SHROUDED IN MISTS, AND THE FRYING-PAN GLACIER.

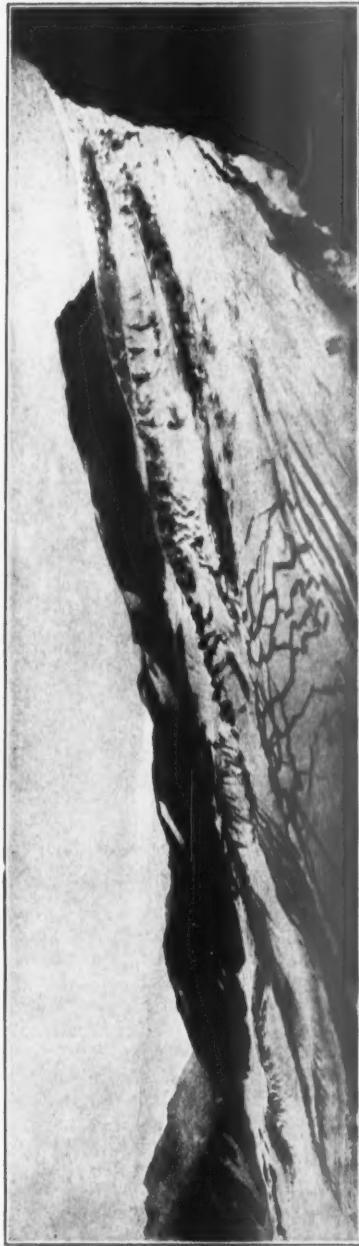


Photo by Curtis.

THE CASCADES AND DOMES OF WINTHROP GLACIER. IN THE DISTANCE IS THE "WEDGE" WITH "STEAMBOAT PROW"
PARTING THE DESCENDING NEVES.

siderable distance a central lane of clear ice. The stream which it sends forth, White River, is the largest of all the ice-fed streams radiating from the peak. It flows northward and then turns in a northwesterly direction, emptying finally in Puget Sound at the city of Seattle.

WINTHROP GLACIER.²

On the northeast side of the mountain, descending from the same high névés as the Emmons Glacier, is the Winthrop Glacier. Not until halfway down, at an elevation of about 10,000 feet, does it detach itself as a separate ice stream.

the domes require a word of interpretation. They are underlain by rounded bosses of especially resistant rock. Over these the ice is lifted, much as is the water of a swift mountain torrent over submerged boulders. Immediately above each obstruction the ice appears compact and free from crevasses, but as it reaches the top and begins to pour over it breaks, and a network of intersecting cracks divides it into erect, angular blocks and fantastic obelisks. Below each dome there is, as a rule, a deep hollow partly inclosed by trailing ice ridges, analogous to the whirling



Photo by Geo. V. Caesar.

A CREVASSED DOME ON THE LOWER WINTHROP GLACIER.

The division takes place at the apex of that great triangular interspace so aptly named "the Wedge." Upon its sharp cliff edge, Steamboat Prow, the descending névés part, it has been said, like swiftflowing waters upon the dividing bow of a ship at anchor. The simile is an excellent one; even the long foam crest, rising along the ship's side, is represented by a wave of ice.

Of greatest interest on the Winthrop Glacier are the ice cascades and domes. Evidently the glacier's bed is a very uneven one, giving rise to falls and pools, such as one observes in a turbulent trout stream. The cascades explain themselves readily enough, but

eddy that occurs normally below a boulder in a brook. Thus does a glacier simulate a stream of water even in its minor details.

The domes of the Winthrop Glacier measure 50 to 60 feet in height. A sample of the kind of obstruction that produces them appears, as if specially provided to satisfy human curiosity, near the terminus of the glacier. There one may see, close to the west wall of the troughlike bed, a projecting rock mass, rounded and smoothly polished over which the glacier rode but a short time ago.

Another feature of interest sometimes met with on the Winthrop Glacier,

² On some earlier Government maps this glacier is called White Glacier.

and for that matter also on the other ice streams of Mount Rainier, are the "glacier tables." These consist of slabs of rock mounted each on a pedestal of snow and producing the effect of huge toadstools. The slabs are always of large size, while the pedestals vary from a few inches to several feet in height.

CARBON GLACIER.

In many ways the most interesting of all the ice streams on Mount Rainier is the Carbon Glacier, the great ice river on the north side, which flows between those two charming natural gardens,

the great hollow, however, and so simple are its outlines that the eye finds difficulty in correctly estimating the dimensions. Not until an avalanche breaks from the 300-foot névé cliff above and hurls itself over the precipice with crashing thunder, does one begin to realize the depth of the colossal recess. The falling snow mass is several seconds in descending, and though weighing hundreds of tons, seemingly floats down with the leisureliness of a feather.

These avalanches were once believed to be the authors of the cirque. They

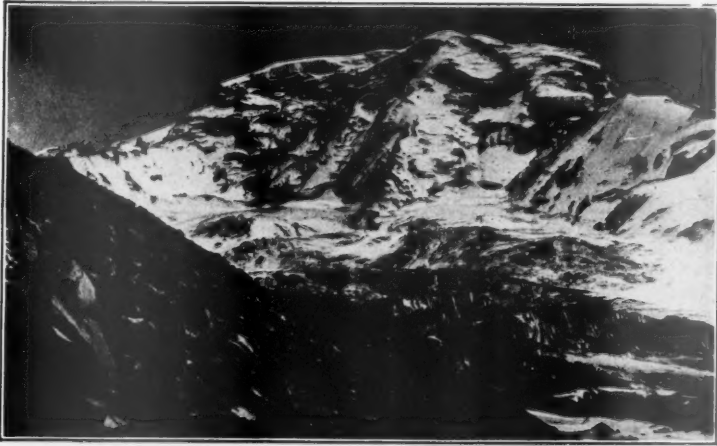


Photo by Geo. V. Caesar.

THE GREAT AMPHITHEATER OF CARBON GLACIER

THE HEADWALL MEASURES 3,600 FEET IN HEIGHT. GREAT AVALANCHES FALL PERIODICALLY FROM THE SNOW CLIFFS ABOVE, WHICH THEMSELVES ARE 200 TO 300 FEET HIGH.

Moraine Park and Spray Park. The third glacier in point of length, it heads, curiously, not on the summit, but in a profound, walled-in amphitheater, inset low into the mountain's flank. This amphitheater is what is technically known as a glacial cirque, a horseshoe-shaped basin elaborated by the ice from a deep gash that existed originally in the volcano's side. It has the distinction of being the largest of all the ice-sculptured cirques on Mount Rainier, and one of the grandest in the world. It measures more than a mile and a half in diameter, while its head wall towers a sheer 3,600 feet. So well proportioned is

were thought to have worn back the head wall little by little, even as a waterfall causes the cliff under it to recede. But the real manner in which glacial cirques evolve is better understood today. It is now known that cirques are produced primarily by the eroding action of the ice masses embedded in them. Slowly creeping forward, these ice masses, shod as they are with debris derived from the encircling cliffs, scour and scoop out their hollow sites, and enlarge and deepen them by degrees. Seconding this work is the rock-splitting action of water freezing in the interstices of the rock walls. This

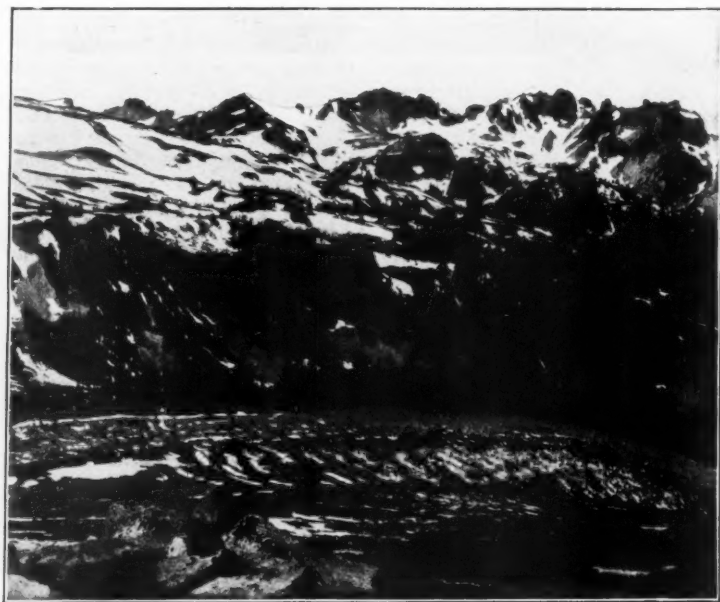


Photo by Geo. V. Caesar.

LOWER COURSE OF CARBON GLACIER.

THIS SHOWS THE MEDIAL MORAINES. IN THE BACKGROUND ARE THE MOTHER MOUNTAINS.

process is particularly effective in the great cleft at the glacier's head, between ice and cliff. This abyss is periodically filled with fresh snows, which freeze to the rock; then, as the glacier moves away, it tears or plucks out the frost-split fragments from the wall. Thus the latter is continually being undercut. The overhanging portions fall down, as decomposition lessens their cohesion, and so the entire cliff recedes.

West of the profound canyon of the Carbon River, there rises a craggy range which the Indians have named the Mother Mountains. From its narrow backbone one looks down on either side into broadly open, semicircular valley heads. Some drain northward to the Carbon River, some southward to the Mowich River. Encircling them run attenuated rock partitions, surmounted by low, angular peaks; while cutting across their stairwise descending floors are precipitous steps of rock, a hundred feet in height. On the treads lie scattered shallow lakelets, strung to-

gether by little silvery brooks trickling in capricious courses.

Most impressive is the basin that lies immediately under the west end of the range. Smoothly rounded like a bowl, it holds in its center an almost circular lake of vivid emerald hue—that mysterious body of water known as Crater Lake. Let it be said at once that this appellation is an unfortunate misnomer. The basin is not of volcanic origin. It lies in lava and other volcanic rocks, to be sure, but these are merely spreading layers of the cone of Mount Rainier. Ice is the agent responsible for the carving of the hollow. It was once the cradle of a glacier, and that ice mass, gnawing headward and deploying even as the Carbon Glacier does today, enlarged its site into a horseshoe basin, a typical glacial cirque. The lake in the center is a strictly normal feature; many glacial cirques possess such bowls, scooped out by the eroding ice masses from the weaker portions of the rock floor; only it is seldom that such features acquire the symmetry of form exhibited by

Crater Lake. The lakelets observed in the neighboring valley heads—all of which are abandoned cirques—are of similar origin.

It is a significant fact that the empty cirques about the Mother Mountains lie at elevations ranging between 4,500 and 6,000 feet; that is, on an average 5,000 feet lower than the cirques on Mount Rainier which now produce glaciers. Evidently the snow line in glacial times lay at a much lower level than it does today, and the ice mantle of Mount Rainier expanded not merely by the forward lengthening of its ice tongues but by the birth of numerous new glaciers about the mountain's foot. The large size of the empty cirques and canyons, moreover, leads one to infer that many of these new glaciers far exceeded in volume the ice streams descending the volcano's sides. The latter, it is true, increased considerably in thickness during glacial times, but not in proportion to the growth of the low-level glaciers. Nor is this surprising in view of the heavy snowfalls occurring on the mountain's lower slopes. There is good reason to believe, moreover, that the cool glacial climate resulted in a general lowering of the zone of heaviest snowfall. It probably was depressed to levels between 4,000 and 6,000 feet. Not only the cirque glaciers about the Mother Mountains, but all the neighboring ice streams of the glacial epoch originated within this zone, as is indicated by the altitudes of the cirques throughout the adjoining portions of the Cascade Range. By their confluence these ice bodies produced a great system of glaciers that filled all the valleys of this mountain belt and even protruded beyond its western front.

To these extensive valley glaciers the ice flows of Mount Rainier stood in the relation of mere tributaries. They descended from regions of rather scant snowfall, for the peak in those days of frigid climate rose some 10,000 feet above the zone of heaviest snowfall, into atmospheric strata of relative dryness. It may well be, indeed, that it carried then but little more snow upon its summit than it does today.



THE NORTH MOWICH GLACIER AND THE ICEFIELDS TO THE SOUTH OF IT.

Copyrighted Photography Curtis.



Copyrighted photo by Curtis.

MOUNT RAINIER AND SPRAY PARK.

THIS IS THE NORTHWEST SIDE AS VIEWED FROM THE MOTHER MOUNTAINS. THE SHARP WHITE SUMMIT IS LIBERTY CAP (14,112 FEET).

NORTH MOWICH GLACIER.³

The North Mowich Glacier is the northernmost of the series of ice bodies on the west flank of Mount Rainier. Like the Carbon Glacier, it heads in a cirque at the base of the Liberty Cap massif, fed by direct snow precipitation, by wind drifting, and by avalanches. The cirque is small and shallow, not as capacious even as either of the twin recesses in the Carbon Glacier's amphitheater. As a consequence the ice stream issuing from it is of only moderate volume; nevertheless it attains a length of $3\frac{3}{4}$ miles. This is due in part to the heavy snows that reenforce it throughout its middle course and in part to overflows from the ice fields bordering it on the south. These ice fields, almost extensive enough to be considered a distinct glacier, are separated from the

North Mowich Glacier only by a row of pinnacles, the remnants evidently of a narrow rock partition of "cleaver," now demolished by the ice. The lowest and most prominent of the rock spires bears the appropriate name of "The Needle" (7,587 feet).

The débris-covered lower end of the glacier splits into two short lobes on a rounded boss in the middle of the channel. This boss, but a short time ago, was overridden by the glacier and then undoubtedly gave rise to an ice dome of the kind so numerous farther up on the North Mowich Glacier and also characteristic of the Winthrop Glacier.

SOUTH MOWICH GLACIER.⁴

Separated from the ice fields of the North Mowich Glacier by a great triangular ice field (named Edmunds

³ On some earlier Government maps this glacier is called Willis Glacier.

⁴ On some earlier Government maps this glacier is called Edmunds Glacier.



by Curtis.

WEST SIDE OF MOUNT RAINIER.

A telephoto view taken from Electron, at a distance of 20 miles. The main summit, composed of two new cinder cones (14,408 feet) is seen in the center. To the left is Liberty Cap (14,112 feet), and to the right is Peak Success (14,150 feet), both remnants of the old crater rim. The glaciers in view are 1, North Mowich; 2, Edmunds; 3, South Mowich; 4, Puyallup; 5, Tahoma.

Glacier) lies the South Mowich Glacier, also a cirque-born ice stream, heading against the base of the Liberty Cap massif. It is the shortest of the western glaciers, measuring only a scant 3 miles. Aside from the snows accumulating in its ill-shaped cirque it receives strong reinforcements from its neighbor to the south—the Puyallup Glacier.

PUYALLUP GLACIER.

What especially distinguishes the Puyallup Glacier from its neighbors to the north is the great elevation of its cirque. The Carbon, North Mowich, and South Mowich Glaciers all head at levels of about 10,000 feet. The amphitheatre of the Puyallup Glacier, on the contrary, opens a full 2,000 feet higher up. Encircled by a great vertical wall that cuts into the Liberty Cap platform from the south, it has evidently developed through glacial sapping from a hollow of volcanic origin. From this

great reservoir the Puyallup Glacier descends by a rather narrow chute. Then it expands again to a width of three-fourths of a mile and sends a portion of its volume to the South Mowich Glacier. In spite of this loss it continues to expand, reaching a maximum width of a mile and a total length of 4 miles. No doubt this is accounted for by the heavy snowfalls that replenish it throughout its course.

TAHOMA GLACIER.

Immediately south of the elevated amphitheater of the Puyallup Glacier the crater rim of the volcano is breached for a distance of half a mile. Through this gap tumbles a voluminous cascade from the névé fields about the summit, and this cascade, reenforced by a flow from the Puyallup cirque, forms the great Tahoma Glacier, the most impressive ice stream on the southwest side. Separated from its northern



PEARL FALLS.

HERE THE WATER PLUNGES 300 FEET OVER A VERTICAL CLIFF OF COLUMNAR BASALT UNDER PYRAMID GLACIER. THE COLUMNS ARE SOLID AND UNBROKEN FOR 200 FEET.



Photo by Curtis.

THE LOWER END.

The Kautz Glacier in its box canyon, seen from the heights of Van Trump Park. Note the strong medial moraine that gradually develops into a ridge 100 feet high above the ice; also the rivulets on the surface of the glacier.

neighbor by a rock cleaver of remarkable length and straightness, it flows in a direct course for a distance of 5 miles. Its surface, more than a mile broad in places, is diversified by countless ice falls and cataracts.

SOUTH TAHOMA GLACIER.

The partner of the Tahoma Glacier, known as the South Tahoma Glacier, heads in a profound cirque sculptured in the flanks of the great buttress that culminates in Peak Success (14,150

feet). It is interesting chiefly as an example of a cirque-born glacier, nourished almost exclusively by direct snow-falls from the clouds and by eddy winds. In spite of its position, exposed to the midday sun, it attains a length of nearly 4 miles, a fact which impressively attests the ampleness of its ice supply.

KAUTZ GLACIER.

East of the South Tahoma Glacier, heading against a great cleaver that descends from Peak Success, lies a

triangular ice field, or interglacier, named Pyramid Glacier. It covers a fairly smooth, gently sloping platform underlain by a heavy lava bed, and breaking off at its lower edge in precipitous, columnar cliffs. Into this platform a profound but narrow box canyon has been incised by an ice stream descending from the summit névés east of Peak Success. This is the Kautz Glacier, an ice stream peculiar for its exceeding slenderness. On the map it presents almost a worm-like appearance, heightened perhaps by its strongly sinuous course. In spite of its meager width,

locality that the ice has been unable to hew out a wider passage. Not its entire volume, however, was squeezed through the narrow portal; there is abundant evidence showing that in glacial times when the ice stream was more voluminous it overrode the rock buttresses on the west side of the gorge.

VAN TRUMP GLACIER.

The name of P. B. Van Trump, the hardy pioneer climber of Mount Rainier, has been attached to the interglacier situated between the Kautz and the Nisqually Glaciers. This ice body lies



Photo by Geo. V. Caesar.

ICE CAVE AT LOWER END OF CARBON GLACIER FROM WHICH CARBON RIVER ISSUES.

which averages about 1,000 feet, the ice stream attains a length of almost 4 miles and descends to an altitude of 4,800 feet. This no doubt is to be attributed in large measure to the protecting influence of the box canyon.

A singularly fascinating spectacle is that which the moraine-covered lower end of the glacier presents from the height of Van Trump Park. A full 1,000 feet down one looks upon the ice stream as it curves around a sharp bend in its canyon.

A short distance below the glacier's terminus, the canyon contracts abruptly to a gorge only 300 feet in width. So resistant is the columnar basalt in this

on the uneven surface of an extensive wedge that tapers upward to a sharp point—one of the remnants of the old crater rim. A number of small ice fields are distributed on this wedge, each ensconced in a hollow inclosed more or less completely by low ridges. By gradually deploying each of these ice bodies has enlarged its site, and thus the dividing ridges have been converted into slender rock walls or cleavers. In many places they have even been completely consumed and the ice fields coalesced. The Van Trump Glacier is the most extensive of these composite ice fields. The rapid melting which it has suffered in the last decades, however, has

gone far toward dismembering it; already several small ice strips are threatening to become separated from the main body.

In glacial times the Van Trump Glacier sent forth at least six lobes, most of which converged farther down in the narrow valleys traversing the attractive alpine region now known as Van Trump Park. This upland park owes its scenic charm largely to its manifold glacial features and is diversified by cirques, canyons, lakelets, moraines, and waterfalls.

In the foregoing descriptions the endeavor has been to make clear how widely the glaciers of Mount Rainier differ in character, in situation, and in size. They are not to be conceived as mere ice tongues radiating down the slopes of the volcano from an ice cap on

its crown. There is no ice cap, properly speaking and there has perhaps never been one at any time in the mountain's history, not even during the glacial epochs.

Several of the main ice streams head in the névés gathering about the summit craters, but a larger number originate in profound amphitheaters carved in the mountain's flanks, at levels fully 4,000 feet below the summit. In the general distribution of the glaciers the low temperatures prevailing at high altitudes have, of course, been a controlling factor; nevertheless in many instances their influence has been out-balanced by topographic features favoring local snow accumulation and by the heavy snowfalls occurring on the lower slopes.

From a bulletin by F. E. Matthes.

FIRE DANGER SERIOUS

THE fire situation in the Northwest is the most serious since 1910, which went down in history as the worst year since organized patrol had been in effect. So far, however, no serious damage to standing timber has resulted. This can be attributed entirely to the organized protection forces, which are giving conclusive proof of their ability to cope with a bad situation.

No rain has fallen for nearly two months and the woods are extremely dry.

The worst fire of record on private lands so far this year is in Lotah County, Idaho. The Potlatch Timber Protective Association during the first part of August had a crew of from 250 to 800 men fighting the fire and practically prevented the loss of any green timber. There was, however, of necessity some loss of logging equipment.

Up to early August most fires have been in old slashings, and in the lower and more thickly settled country. With the opening of the hunting season, however, fires started in the higher areas.

While no predictions can be made, it is felt by protection agencies generally, that in the absence of unusually high winds or excessive temperatures during August, losses can be kept down to a low figure. Although a large number of fires have occurred in Oregon this season, there has been no material loss of green timber, and slight loss of logging equipment, according to reports received by the Oregon Forest Fire Association. Fire fighting expenses will, however, be heavy in some sections.

A considerable crew of men have been constantly engaged in this work since early in July. Only in two or three instances have fires gotten such a start as to allow of their going into the tops. Great apprehension is felt because of the fact that many deer hunters are in the mountains. The country is extremely smoky, rendering many lookout points valueless. The private owners of timber have some 300 wardens in the field and the state ninety. This number is in addition to the force of the Forest Service.

An appropriation of \$25,000.00 was

made available by the passage of the Federal Sundry Civil Bill with which to furnish protection for some two million acres within the Oregon & California Railroad Company's grant, title to which is in question. The Government brought action to cancel title to this grant over a year ago and decision is now pending before the United States Supreme Court. About ninety patrolmen went on duty in Western Oregon to protect the grant early in August. The Forest Service which has been given charge of conducting the work of protection is acting in close coöperation with existing protection agencies.

Washington had seventy fires during July, nearly all of them being slashing fires. A few logs were burned as well as some camp equipment, and the improvement of one settler. Accurate figures on losses are not available, but the amount is small, taking into account the number of fires occurring. Donkey engines, locomotives, berry pickers, and lightning are given as the causes of the fires. About 100 men are on patrol duty for the Washington Forest Fire Association, while the State Fire Warden has on some seventy men.

Idaho in common with other states has experienced high temperatures and practically no rain during July. A number of fires have started, but prompt discovery has practically prevented loss. A small amount of green timber has been fire-killed. Campers, lightning and brush-burning are responsible for nearly all fires which have occur-

red in the state. The full patrol force is on duty.

Montana has experienced no severe fires. The State and Forest Service are coöperating in an effort to properly cover the timbered sections adjacent to the National Forests.

Oregon reports about 100 fires for the month, the most severe ones being in old slashings. An inconsiderable amount of green timber has been fire-killed. The State Forester has ninety men on patrol paid by State and Weeks law funds and private owners are employing 300 wardens. Telephone service which has been greatly improved the past year is proving a marked factor in protection work. High winds, hot weather and practically no precipitation have put the woods in dangerous condition.

Reports from portions of California indicate more favorable conditions than last season, while the contrary is true elsewhere in the northwest.

Throughout the northwest the preparations made early in the season to meet a bad year are proving extremely helpful. Never before has such close working coöperation existed between the Government, States, and private patrols, and to this can be largely attributed the success of the work up to the present time. From now on hunters and campers will be going into the mountains, and their coöperation is needed to prevent fires. Loggers, road builders and ranchers should be doubly careful with fire. Only through such care will serious fires be averted.



LOGGING A RIVER BOTTOM

By EDWARD F. BIGELOW.

FOR some two decades, beginning a half century ago and ending thirty years ago, Big Rapids, Michigan, was one of the famous lumber centers of the United States. Here was the finest, tallest, biggest trees. Here existed the typical methods of lumber cutting of that period. Lumber was so plentiful that it was gathered recklessly. The methods of taking a claim were such as to attract large numbers of lumbermen, and for a hundred miles up the river, the sound of saws and axes was heard on every side, and far back into the country. Logs in a profusion seemingly endless filled the river. They filled it not only on the surface, but they filled the entire river to the bottom of the deepest places in the channel. They were piled in the river in such numbers that logs on top pushed other logs to the bottom, and still others came on top of these, till the river for many miles was, in places, a solid mass of logs.

A year ago last summer, the dam at Big Rapids, Michigan, was carried away. In some eastern places the breaking of such a dam would be followed by an abnormal supply of fish. Old settlers tell of their experience in

carrying off fish by the wagonload and the cartload; but here was revealed to the present generation the amazing fact that the entire bottom of the river was a matted mass of logs. When the dam broke, great was the astonishment at the sight of that thick floor of logs. The Muskegon Lumber Company bought from the original owners their rights, and began the removal. The work of taking the logs from the river bottom has been done until logs line the banks to a width of many rods and for long distances, a lumbering scene that must rival the busiest scenes of the lumber camps that existed more than thirty years ago. The logs were water-soaked, but in fairly good condition. The accompanying photographs show one section after the lumber company had been at work for several months. Unfortunately no local photographer seemed to appreciate the picturesqueness and the novelty of such an astonishing sight. No photographs of the scene at its best are obtainable.

Old-timers of Big Rapids become loquacious and tell of the interesting scenes of the time when the "river hogs," as the waders were called, made things lively in that town of mushroom growth. It was a mecca for all kinds



THE RIVER BANK IS LINED WITH LOGS.



THE LOGS LINE THE RAILROAD TRACKS AS WELL AS THE RIVER BANK FOR MILES.

of workers in logging, but especially for those who were skilled in setting loose huge piles of logs to float down the stream. These logs would often become wedged together, when a skilful "river hog" could, with a cant hook, remove the keystone log and let the immense heap go tumbling free with thundering noise and swirling currents, only perhaps to become again blocked in another place.

These old-time residents are interested in deciphering the various marks on the ends of the logs, and in pleasant reminiscence they talk of the "good old times" when such men as "Doc" Blodgett and others were active. It is probable that in all the United States there has never been such novel lumbering scenes, nor such deeds as have been done in this last year in Big Rapids.

Mr. James Gow, of Muskegon, Michigan, is the prime mover in this work. He is and for a long time has been the president of the Muskegon Log Owners' Booming Company. He

has been personally able to purchase ninety-six per cent. of all the marks that were used by the old-time loggers on the Muskegon Lake and Muskegon tributaries. At the present time Mr. Gow owns nine hundred and thirty-four marks and controls others.

He and his company have been securing and will continue to secure an almost incredible amount of lumber from the bottom of the river. In the last two years alone he has secured 50,000 logs. Of this astonishing number, 24,000 were raised in the vicinity of Big Rapids. The rest have been taken at different points between Maple Island and Muskegon, where his mill is located. At these points, aside from Big Rapids, the logs are raised by a machine known as a log lifter, which is practically a scow fitted up with the proper machinery. When the dam was removed at Big Rapids the water ran off. It was then a simple matter to haul the logs out of the muddy river bed to the bank, where they are left to

dry. A section of these drying logs is shown in the accompanying photographs. An enormous number has already been removed. It is almost impossible to ascertain what can yet be done. A capable and conservative man who has investigated the matter does not hesitate to say that there are more than 600,000,000 feet of logs in this

age, but they seem to have been satisfied if they secured 75 per cent and left 25 per cent to vanish. Such recklessness is suggestive of the wholesale slaughtering of the wild pigeons. At one time flocks of pigeons were so numerous and so crowded that they consumed a whole day in passing over a given point, and darkened the land-



ALL THE RIVER LOGS BEAR THEIR OWNERS IDENTIFYING NUMBERS OR MARKS.

stream and its tributaries. No one knows what may yet be obtained from the small river Manistee. Some state that more than 40,000,000 feet have already been raised. It is said that some of the islands are founded on a mass of logs that extend to an unknown depth.

What careless accounting there must have been, to allow 600,000,000 feet of lumber to become stranded in the river with nobody even to attempt to recover it, or perhaps even to know of it. The owners of these thousands of logs must in those days have known of the short-

scape. Such great flocks were caught in nets and slaughtered by the thousand as food for hogs. The pigeons have been exterminated; and a shortage in lumber is beginning to be felt.

Old-time lumbermen tell of characters once famous among them. One particularly is cited in a cordial way as Dr. Blodgett, commonly known as the "Doc," a nickname given to him when a young man. Long ago he was laid away to rest with other prominent lumbermen, such as Ryerson, Hill and Charles H. Hackley, who accumulated upwards of \$9,000,000. Few people have done



FROM RIVER BANK TO SAWMILL.

HUNDREDS AND HUNDREDS OF CAR LOADS HAVE BEEN TAKEN FROM THE BOTTOM OF THE RIVER AND SHIPPED BY RAIL TO THE SAWMILLS.

more for a city than Mr. Hackley has done. He did philanthropic work for Muskegon on a grand scale, and left by his will more than \$2,000,000 for the establishment of libraries, hospitals, art gallery, training schools and other things of public benefit.

Mr. Hackley was the first man to erect a monument to President McKinley.

Probably the credit for the first suggestion of this novel method of raising logs from the river bed belongs to Mr. John Torrent, who is yet living at the age of eighty-two years and is still an active man. He interested Mr. James Gow, of Muskegon, Mich., in the proposition, after he had been in the lumbering business for more than thirty years in partnership with Mr. John Campbell. In the year 1912, Mr. Gow bought out Mr. Campbell's interest with this proposition in view and says that he feels well pleased with the plan.

The old lumberman, with possibly a few exceptions, came to Muskegon when they were young, and having plenty of energy and brains, lifted

themselves from poverty into financial prominence. A story of those exciting lumbering days would not be complete without mention of Jonathan Boyce. He, with others, overcame many obstacles in those pioneer times. One that Mr. Gow had to contend against was the claim that, because these logs have lain for so long a time in the river with apparently no ownership, any person had the right to salvage and keep them. One sawmill started in to cut up some of these logs without securing any right or title, but Mr. Gow got ahead of them by buying up the marks from the heirs and then fought the matter in the courts. In 1908 Mr. Gow was successful in the supreme court of Michigan, winning a suit that firmly established his claim to logs bearing marks that he owned, and he now has the entire right of way in this novel lumbering from the bed of the rivers.

The astonishing fact is that the lumber produced from these logs is of pretty nearly as good quality as when they were first cut and for some purposes equally good.



HANDLING MANUFACTURED LUMBER.

THE FIRST CABLEWAY FOR THIS PURPOSE IS INSTALLED BY THE PORT BLAKELY MILL COMPANY OF SEATTLE, WASHINGTON.

HANDLING LUMBER BY CABLEWAY

THE economy, facility and rapidity with which logs can be handled by overhead cableways has been demonstrated in many places. Such cableways, in their varieties, are in use in many parts of the world for taking logs out of the woods, loading them on cars and vessels, transporting them across gullies and streams, unloading vessels and cars or picking the logs up from the water and storing them in piles and sorting and feeding them to the mills.

The Port Blakely Mill Company is, however, the first concern in the country to install a cableway solely for the purpose of handling manufactured lumber. The great success of this cableway and the satisfaction which it has given to the purchaser make a description of this cableway and its uses interesting.

The Port Blakely Mill Company is

one of the best known concerns in the Northwest. They have been operating since 1858 and built up a business which required one of the largest mills in the country. The mill site is on an inlet opening into Puget Sound directly opposite Seattle and about seven or eight miles from that city. The mill was built on the North shore of the inlet, where an extensive dock frontage was developed. The yards for lumber are on the South side of the inlet. These yards are close to three-quarters of a mile long and are separated from the North shore, where the mill stands, by something like 400 or 500 feet of open water. As originally arranged, there was a bridge across the inlet and the manufactured lumber, which was to be held in stock, or shipped by rail, was taken across the bridge. A fire de-

stroyed the mill in 1907. Part of the dock and the bridge were also burned.

When the new mill was built the matter of transporting the manufactured lumber across the inlet to the yards and railroad was taken up with the Lidgerwood Mfg. Co. and it was determined to substitute a cableway for the bridge. The mill has a capacity of 305 M. feet per day. Part of this output is shipped by water and the vessels lie at the north, or mill side, of the inlet to receive this. A large portion of the lumber is, however, brought across the inlet, either to be temporarily stored, or to be shipped by rail. Railroad tracks run through the yards, as can be seen in the cut.

The logs come to the mill in rafts and are taken in by means of the usual haul-up chains at the far end of the mill, as it is seen in the illustration. The finished lumber comes out at the end of the mill seen in the center of the illustration. Boards and similar material, go to sorting tables on the north side of this wing and are loaded by hand on trucks. The trucks each carry a load of 1,000 board feet. Large dimension lumber is delivered from the end of the wing and is loaded on the trucks in the same sized loads as the boards. The trucks are four feet wide and nine feet long, built of timber, and run on two wheels and an axle under the center of each truck. The trucks

are run out to where they are under the cableway, the cableway picks them up, lumber and all, carries them across the inlet and lowers them down to any of the many run-aways or tracks provided in the yards. In the illustration a truck loaded with lumber is seen suspended in the center of the picture ready to be landed wherever it may be wanted for distributing the lumber.

The cableway may be used also for loading lumber directly from the yards into scows or upon cars.

The cableway was designed for a capacity of 15,000 feet per hour, but it has many times exceeded this in actual practice, especially when handling lumber both ways. The cableway was designed and built by the Lidgerwood Mfg. Co., of New York. Its total span between towers is 1,176 feet. The towers are of wood. The head tower is 100 feet high and the tail tower is 90 feet in height. It is nominally a five-ton cableway, intended to carry loads of from four to six tons. The usual load is about 4,000 pounds of lumber and the weight of the truck, which is about 900 pounds. The loads are hoisted at a speed of 250 feet per minute, and the carriage, or conveying speed, along the cable is 1,200 feet per minute. A fair average speed of operation is twenty trips per hour, but as many as twenty-five trips may be made under favorable conditions.

A ROADSIDE TREE LAW

By CHAPIN JONES
Assistant State Forester

THE growing sentiment in Maryland in favor of the planting, care and protection of roadside trees has crystallized in the passage by the Legislature of 1914 of a roadside tree law, which has placed Maryland in the front rank of the states making provision for beautifying its roadsides. Before the passage of this law the situation in Maryland was the same as in other states

where there is no definit provision by law for their protection. While public opinion is practically unanimous in desiring their protection and deploring their mutilation, yet no one is legally authorized to defend them, and since what is everybody's business is nobody's business the roadside trees, some of them cherished, old landmarks, have been mutilated and destroyed ruthlessly, principally by telephone and electric

light companies which have wanted to save a little expense in erecting and maintaining their lines.

Planting of trees has also been done only in a very spasmodic way and on a small scale because there was no assurance that the trees would be protected and because everyone feels that the expense of such work should be borne by the public and not by private individuals. It is also recognized that in addition to the beauty of shade trees along a road or street and the great contribution to the comfort of traveling which is afforded by their shade and the lessening of the force of the winds, trees along an improved road are of decided advantage from the standpoint of maintaining in good condition the surface of the road itself, and should therefore be considered part of the improvements of the road. The heavy traffic on modern improved roads grinds the stone surface, and if the surface is dry the suction from the swiftly moving automobiles lifts this binder in clouds of dust which is then blown away; but the binder remains in place if moist, as it is when well shaded by trees on the side. In view of these conditions public opinion was very strongly in favor of the movement to put the control of roadside and street trees under the State Board of Forestry, and the passage of the roadside tree law has met with almost unanimous approval.

The law stipulates that the term roadside trees means all trees planted by the Forest Wardens, or existing trees three inches or more in diameter, measured two feet from the ground, that may be growing within the right-of-way of any public road or between the curb lines and property lines of any streets in an incorporated town in the State. The trees on the streets of the City of Baltimore come under the provisions of the law, but since the City presents a peculiar problem and since before the passage of the State law it had a City Forester and an appropriation for this particular work, the administration of the trees on the streets in the City is being left to the City Forester as before.

It is made a misdemeanor punishable by a fine for any person to cut down, trim, mutilate or in any manner injure any roadside tree without a permit from the State Board of Forestry, except in an emergency where trees have been uprooted or branches broken in such a way as to endanger persons or property; and it is made the duty of the Forest Wardens and others having police power in the State to arrest all offenders. Under this provision wanton mutilation of trees will in all cases be prosecuted by the State Board of Forestry, and where trimming is desired by pole line companies in order to free their wires from contact with trees which are growing into them, permission will be given where such work can be done without any great damage to the trees and where the value of the service by the electric light or telephone company justifies it, but always under the direct supervision of a Forest Warden of the State of Maryland, who has been instructed in the correct principles and methods by the experts of the State Board of Forestry. In many instances if the work is done right, considerable trimming can be done in a tree without any appreciable damage being done, provided it is done by people who understand it and have the welfare of the tree at heart.

The leaving of stubs is not permitted. All cuts must be properly made and all large ones covered with an antiseptic, and the use of climbing irons on trees is forbidden.

It is provided that the planting of trees along roadsides shall be done only according to plans approved by the State Forester. This provision is made in order that the trees planted may be of good stock, of the right species and suitably spaced, etc., and in order that the street or road may be developed systematically and uniformly. The average person has little knowledge of such matters and as a result planting has often been done of inferior species and shade trees have usually been placed too close together, and in the matter of caring for trees by spraying, it is very necessary that it should be under the control of the State Forester since un-

less just the right methods are pursued the results are of little value and since spraying by one person of the trees in his neighborhood would not accomplish sufficient results unless his neighbors also adopted such measures. The necessity of having such work controlled by the State is perfectly evident in the case of Massachusetts and other states where the damage by caterpillars and leaf-eating insects is much more severe than it is at present in Maryland. The initiative in applying for the planting and care of trees can be taken by the County Commissioners, the Road Supervisor of any County, the State Roads Commission, the Town Council of any incorporated town, or by any organization or person, but the plan of procedure cannot go into effect without the approval of the State Forester or his agent. The organization desiring the work done must then guarantee the cost of the original planting and also of such subsequent care as may be necessary.

It is provided that the State Forester may at his discretion without being requested as above, plant, care for and protect roadside trees with the consent of the adjoining property owner, and pay for such work out of any unexpended balance to the credit of the Board, but since the Roadside Tree Law itself carries no appropriation it would be out of the question for the State Forester to do such planting except on a very small scale as a demonstration of what can be done. An appropriation to carry on this work is urgently needed and will presumably be provided by the next Legislature.

It is made a misdemeanor punishable by fine for any person in any manner to post any advertising signs or billboards other than such notices which are posted in pursuance of law on any stone, tree, etc., which is upon a public highway or which is on the property of another without first obtaining the written consent of the owner. This is a much needed reform and as a means of beautifying the roads goes hand in hand with the planting and care of roadside trees.

ACTIVITIES UNDER THE NEW LAW.

The State Board of Forestry believed that the most good could be accomplished at once by instituting an organized campaign against the sign board nuisance and designated June 20th as Sign Board Day, the day on which an organized cleaning up of unauthorized advertising signs, billboards, etc., should be made along all the roads in the State. The State Forester mailed copies of the law and letters asking for the names of people who would be apt to assist in this work to a long list of people who would presumably be interested, such as Presidents of Banks, County Commissioners, States Attorneys, members of the State Roads Commission, School Superintendents and School Teachers. The support accorded the movement was very general, and the names of a great many responsible and interested people were sent in, and to these people the State Forester sent a Sign-Board Day badge, copies of the law and printed instructions as to how to proceed in tearing down unauthorized signs, together with a warning not to molest signs on private property which had been erected with the permission of the owner of the land.

The Boy Scouts were also enlisted in the work and did valuable service, for which a number of medals are to be distributed to them.

After this general cleaning up, any such notices that may be posted hereafter will be more conspicuous and very likely to be torn down as soon as they are put up.

In order to enforce the law against trimming of trees without a permit, without any unnecessary friction, the State Forester called at his office a conference of representatives of the various companies operating pole lines in the State. The conference was well attended, and great interest was manifested, and a disposition to co-operate with the State Forester for the benefit of all concerned. The pole line companies, since they are obliged to bear the expenses of the supervision of any trimming by the Forest Wardens, readily agreed to concentrate the work as much as possible and to send in applica-

tions for permits some time in advance of the time when they considered trimming necessary. The State Forester furnished to the companies blank applications for permits, which the companies are now filling in and sending to the State Forester.

While all the details of administration have not as yet been worked out there does not seem to be any insuperable difficulty in working the problem

out along these lines. In each county an inspector, trained and instructed in this work by the State Forester, will personally supervise the more important jobs and in turn instruct the local Forest Wardens in the counties in the principles and methods of procedure.

A considerable improvement in the appearance of the roadside trees in Maryland is confidently expected as a result of the operation of this law.

FIRE PROTECTIVE WORK

MONROE County, Pennsylvania, has been the first to try out the new supplementary acts, passed by the last legislature, which provide for the appointment of State Foresters to act as District Foresters in designated counties, and also for a system of fire patrol. District Forester John L. Strobeck has made two interesting reports upon the practical working of the new laws.

The spring fire season of 1914 was unusually favorable to outbreaks of forest fires. There were thirty-six in all; but some were detected so quickly and put out so promptly that they were not considered important enough to be included in the official reports of the wardens. Mr. Strobeck considers this an error and advises that every fire should hereafter be included in the reports sent to the Commissioner of Forestry. Four thousand eight hundred and forty-two acres were burned over, in different parts of the county. The causes of the fires, according to the reports of the wardens, were as follows:

Unknown, 6; railroads, 15; lighted tobacco, 6; incendiary, 5; brush burning, 3, and lightning, 1.

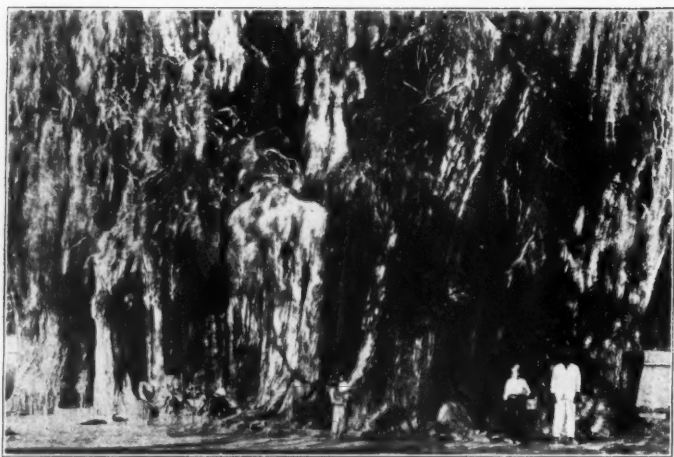
The Pocono Protective Fire Association of Monroe County, took advantage of the recent Act of Legislature, No. 432, to inaugurate a fire patrol in conjunction with the Department of Forestry. Two patrolmen were appointed to try out the new system, and the results of the trial have been so satisfactory that the District Forester is urging an increase in the number of patrolmen before the autumn fire season comes around. He also recommends the establishment of telephone connection with the lookout stations, the distribution of posters, and improvements in apparatus for extinguishing fires.

The cost to the State for fighting these fires amounted to \$282.13. To this sum must be added the cost of maintaining two patrolmen for two months, \$101.00 on the part of the State, and \$100.00 on the part of the Pocono Protective Fire Association.

WANTED—BACK NUMBERS

Members of American Forestry Association who have back numbers of *AMERICAN FORESTRY*, will confer a great favor upon the Association if they will sell to it any of the follow-

ing copies: November, 1908.
October, 1911.
February, 1912.
April, 1912.
May, 1912.



A GIANT TULE TREE, MITLA, MEXICO.
THE CIRCUMFERENCE IS 145 FEET TWO INCHES AND THE TREE HAS BEEN A SILENT WITNESS OF
THE PASSAGE OF SEVERAL CIVILIZATIONS.

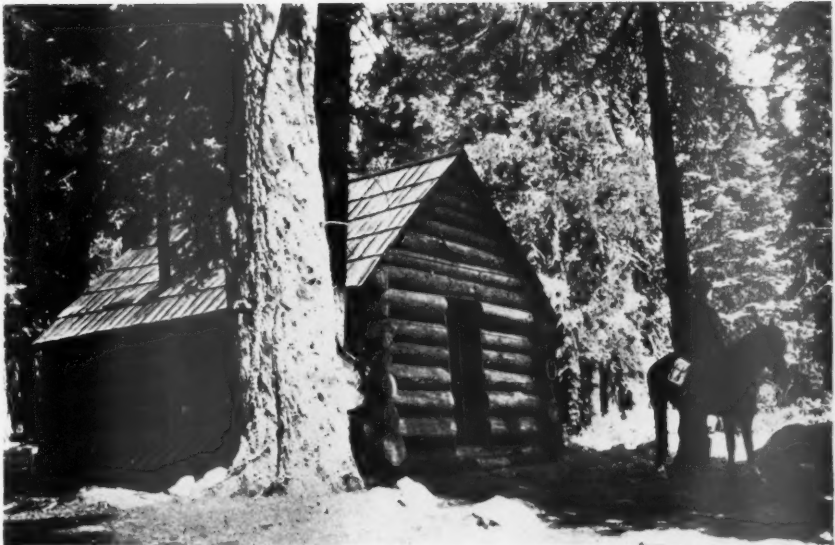
WORLD'S LARGEST TREE TRUNK

THE giant tule tree which stands in the little churchyard at Mitla, Mexico, is an object of interest to many tourists. It is said to have the largest trunk of any tree in the world. Its circumference at its largest point measures 145 feet and 2 inches. So large is this trunk that a full grown man when standing by it appears to be of insignificant size. The ancient tree is greatly revered by the native of that part of Mexico. In passing beneath its overspreading branches these simple-minded people never fail to tarry a moment and pay quiet devotion to the great monument of nature.

The age of this tree is a matter of conjecture. It is said to be no larger now than when it was first discovered

by the Spanish hosts which followed Hernando Cortez to the shore of Mexico nearly four centuries ago, says the *American Lumberman*. According to the theory of some scientists the tree has been silent witness to several different civilizations. Within its shadow, almost, are the prehistoric ruins of Mitla, which are of never-failing interest to all archaeologists. To the romantic mind may be pictured the scene of this giant tree looking down upon the prehistoric people as they builded the great structures which now stand in ruins at its very feet. The tree bids fair to stand through coming centuries and, perhaps, witness other changes in the human progress of events of as great moment as those which it has already passed through.





HEADQUARTERS OF THE CO-OPERATIVE PATROLMAN.

FIRE PROTECTION IN CALIFORNIA

By KNOWLTON MILLS, Forest Examiner, Tahoe National Forest.

IN WORKING towards the ideal of efficient fire protection it is essential to take advantage of every possible chance for cooperation between interested bodies. The possibilities of cooperation have undoubtedly been most fully realized in the Pacific Northwest where the work of private, federal and State agencies is now so well coordinated that the efficiency of all three is thereby greatly increased. Cooperation in protection, however, will necessarily take various forms in meeting various conditions. For the last five years a cooperative agreement has been in force between a pulp and paper company in California and the Forest Service, which has resulted in keeping fire damage on the company's lands down to a minimum and has given complete satisfaction both to the company and to the Service.

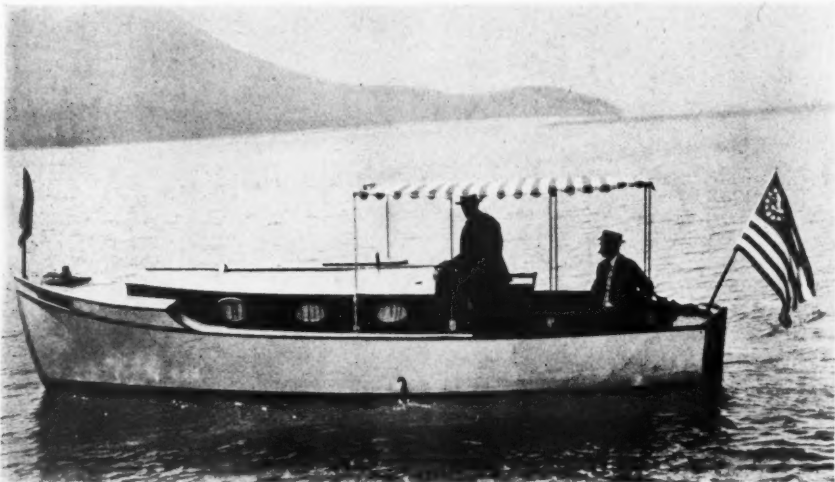
The Crown Columbia Paper Company of San Francisco controls approximately 40,000 acres of timberland in

eastern California and western Nevada, in the region north and northeast of Lake Tahoe and south of the Southern Pacific Railroad. The land is at an elevation of 6,000 to 9,000 feet on the eastern slope of the Sierras and is rough in topography. About 20,000 cords of red fir and white fir pulpwood are cut annually on this tract, for use at the company's pulp and paper mill at Floriston, California.

Although the fire danger in the fir type is not generally excessive, some special factors here contribute to increase the risk. As the tract is located within the lightning belt a number of fires have started from this cause. During the summer a large number of tourists visiting Lake Tahoe frequent the area, causing considerable danger from camp fires. As an additional source of danger wood-cutting for the Lake Tahoe resorts has left a large slash area in the southern part of the tract. With this serious fire risk exist-

ing for six months of the year and with its heavy investment in machinery at the Floriston plant it became evident to the company in the winter of 1908 that it would be a wise policy to insure, as far as possible, the permanence of its supply of raw material by means of a system of organized protection. As the company cuts fir only for pulpwood, leaving the remaining timber, which consists largely of pine, valuable for saw timber, they became convinced that fire protection would eventually pay for itself by protecting the cut-over land

This agreement provides that the district forester and the company establish a system of fire protection on the company's lands, that the supervisor of the Tahoe National Forest shall have full control of all work of patrolmen and fire fighters on the land, that the company pays for protection and patrol during the fire season a maximum of \$250 a month, including the services of not less than three men. The company also agrees to pay towards the cost of fire fighting on its land such amounts as shall be agreed upon with the Super-



FOREST SERVICE FIRE PATROL LAUNCH "RANGER" ON LAKE TAHOE.

as well as the virgin timber. Since the company's lands are either within or closely adjoining the Tahoe National Forest, they were afforded a considerable amount of protection from the Forest Service patrol and lookout system. Feeling the need of more intensive protection, the Secretary of the company, Mr. Frank Schwabacher, whose energy and enthusiasm have been largely responsible for the success of the plan, took up with the District Forester, at the beginning of the fire season in 1909, the proposition of a cooperative agreement. An informal arrangement was then made which was followed continuously until 1913, when a new agreement was made.

visor, and to pay these bills promptly, while the District Forester agrees at the end of the fire season to report to the company on the work done under the agreement, with a detailed statement of expenditures and also show the location, area, total cost and damage of each fire. The contract remains in force year after year until terminated by either party.

An apparent objection to the agreement is that it does not seem to be sufficiently detailed and definite, leaving too much room for misunderstanding. The successful results of the plan, however, have proved that this objection does not hold. Since it was difficult to foresee, for any length of time ahead,



MR. FRANK SCHWABACHER ON INSPECTION TRIP.
SHOWING CALIFORNIA RED FIR PULPWOOD LUMBER IN BACKGROUND.

the exact form which the cooperative work should take and to forecast the methods which would give the greatest protection for the least cost, it seemed best to put the spirit and main essentials of the cooperation into the adopted form, leaving the details to be settled as they come up, by mutual understanding between the company and the Service. This has worked out most satisfactorily, for not the slightest hitch nor misunderstanding has occurred since the beginning of the cooperation, and the work throughout has been followed with keen interest on both sides.

After the informal agreement had been in force for one season the value of having a fire plan for the organization of the cooperative protection work became evident. In 1910 Forest Assistant J. A. Mitchell was detailed for this and constructed a plan which, with some later revisions, has been closely

followed. Its cost was borne by the Company but since its value extends over a long period the cost has not been noticeable from year to year. Each winter the protection work accomplished during the past season is reviewed by Supervisor Bigelow of the Tahoe National Forest and Mr. Schwabacher of the Company, and details of the work for the coming season are discussed and determined. Two patrolmen and a lookout working in coordination with the regular Forest Service organization for the district form an adequate force for present needs. The Service maintains a launch patrol on Lake Tahoe and has a ranger and a fire guard throughout the fire season on that part of the Tahoe Forest which is adjacent to the Company's holdings. A lookout is established on a centrally located peak at an elevation of 8,600 feet, overlooking at least 90 per cent of



TELEPHONE STATION ON PATROL ROUTE.

A NUMBER OF THESE TELEPHONE STATIONS ARE DISTRIBUTED OVER THE DISTRICT SO THAT ALARMS OF FIRE MAY BE SENT QUICKLY TO HEADQUARTERS.

the cooperative tract and covering a range of vision of about 300,000 acres, one-third of which is National Forest land and the remainder alienated land closely adjacent to the Forest boundaries. The cost of the lookout man's salary is divided between the Company and the Service. Constant telephone communication is maintained between the cooperative guards, lookout, launch patrolman and forest rangers. In case of fire the patrolmen get in touch with central stations which send out necessary men and supplies. Several owners and operators in the locality are also prepared to give assistance in emergencies.

The patrolmen are placed in the field before the fire season commences and retained after the danger is over for a short period each year for the purpose of maintaining existing improvements and doing new construction. Since the agreement has been in force five patrolmen's cabins and three pastures have

been built and approximately 50 miles of telephone line and 36 miles of trail have been constructed by the company and Forest Service in cooperation. In the tract north of Lake Tahoe trails and telephones are so arranged that it is not necessary for a patrolman to ride more than two miles from any point to reach a telephone. Trails have been carefully blazed so that men unfamiliar with the country may find their way to any point without guides, in cases of emergency. A fire line about a mile long has been made, protecting a valuable stand of timber from a dangerous slash area. Tools necessary for construction work and fire fighting are stored in adequate amounts at suitable points. An inventory is taken by the district ranger at the end of the season and any losses noted are filled at the opening of the next season so that all tool caches will be fully equipped in case of need.

Only one fire of threatening proportions has occurred on the Company's holdings since 1909. This fire, which burned over an area of about 160 acres, was placed under control before much damage was done. A large number of fires have started but they have all been

smothered in infancy and confined to a fraction of an acre.

The total cost of protection to the Company for the season of 1913 was \$906.86. This amount prorated over the total acreage gives a protection cost of \$0.023 per acre.



WHAT IS IT?

A FLORIDA MONSTER

Although the palmetto swamps of Florida harbor moccasins, rattlesnakes and other reptiles, a sight such as is shown in the accompanying photograph is very unusual, and was quite a shock to the hunter who suddenly came upon

this scene. However, investigation proved that the enormous reptile was quite harmless, being a magnolia tree that has grown into this very unusual shape.



THE CANADIAN DEPARTMENT

By ELWOOD WILSON

Mr. R. H. Campbell, Chief of the Dominion Forest Service, has been made an honorary member of the Royal Scottish Arboricultural Society and has gone to Scotland to receive this honor.

On account of the war, the Canadian Forestry Association has postponed the convention, which was to have been held in Halifax in September.

The following executive committees have been elected by the Canadian Society of Forest Engineers. Maritime Provinces and Quebec, G. C. Piche, A. Bedard and R. B. Miller. Ontario, Clyde Leavitt, T. W. Dwight and J. H. White. Prairie Provinces, Norman M. Ross, W. Alden and L. M. Ellis.

A very curious incident happened to one of the fire-rangers of the St. Maurice Forest Protective Association last week. He was proceeding down the Mattawin River in a canoe and was just about to land at a portage around a rapid when a large cow moose with two calves came out on the bank and started into the water to attack the canoe. The men shouted and tried to drive her away, but she kept on coming into the water and in trying to avoid her the canoe was caught and swept down the rapids, swamping it, and the men barely escaped with their lives, losing part of their baggage.

The Forest Products Laboratory of Canada, located at McGill University, in Montreal, will be in charge of Dr. J. S. Bates, assisted by Mr. O. F. Bryant, B. S. There will be a complete outfit of paper making machinery and every effort will be made to help Canadian Manufacturers in the solving of their problems.

The town of Hearst, in Northern Ontario, was wiped out by a forest fire on June ninth. The loss was about

\$50,000. There had been small fires in the neighborhood for some time, but no attention was paid to them. The fire protection system in Ontario leaves much to be desired.

The Forestry Division of the Laurentide Co., Ltd., has just finished a survey and map of 2350 square miles showing all drainage, roads, portages and trails, lookout stations, telephone lines and timber conditions. This is the first complete map ever made of this section and in order to be of use about 500 square miles of contiguous territory has been mapped. The average error of closure of traverses is one in 300 and the scale of the finished map is two miles to the inch. Maps of each section of 50 square miles on a scale of three-quarters of a mile to one inch have also been completed showing the location and amount of green timber, the burnt and cut over areas, etc. This Company is also importing reindeer from Dr. Grenfell's herd in Newfoundland to take the place of sled dogs which are very troublesome to keep in summer and are not very efficient in winter. This experiment is being watched with much interest. If successful some of these deer will be supplied to the Indians who are finding the game supply getting pretty short.

Dr. B. E. Fernow and Messrs. Leavitt and Wilson were the guests of Mr. W. R. Brown and the Eastern Foresters' Society, at Berlin and Gorham, N. H., and had a most enjoyable time.

The Quebec Government will sell at auction during these months some large timber tracts and some valuable water powers.

The area of British Columbia is 243,000,000 acres, of which approximately 125,000,000 acres is capable of producing merchantable timber. Actually the

virgin forest on all but 30,000,000 acres has been destroyed by fire in the last 60 years. Had no fires occurred the stand of timber would amount to over 1,000,000,000,000 feet B. M. The actual amount is 350,000,000,000.

Timber lands, bearing over 8,000 feet B. M. per acre west of the Cascades, and 5,000 feet B. M. per acre East of the Cascades are reserved by law from alienation from Government ownership. Prior to 1911 timber lands were disposed of by lease or license, by the terms of which the Government retains a royalty interest and the right to regulate cutting. When cutting is completed the land reverts to the Government. About 10,000,000 acres were disposed of in this way. At the present time timber is disposed of only by sale; the conditions being almost identical to those in effect on the U. S. National Forests.

British Columbia obtains an annual revenue of \$2,500,000 from its forests. It expends for forest administration over \$200,000 and for forest protection over \$300,000 annually.

The present annual cut from Provincial Forests is 1,200,000,000 feet B. M. per annum of logs, shingle bolts, cordwood and pulpwood.

The Forests are administered through 11 District Foresters, whose districts, occupy 15,000,000 acres gross, covering all the settled portion of British Columbia outside the Dominion Railway Belt. The District Foresters are assisted by 36 Rangers and 6 Forest Assistants.

The Protection Force consists of about 200 Forest Guards employed for the whole of the fire season from May

1st to October 1st; 100 patrolmen in the dangerous months of July and August and 40 patrolmen on railway construction.

The Dominion Railway Belt, an area of about 11,000,000 acres, extending across the province 20 miles on each side of the C. P. Ry., is under the administration of the Dominion Forestry Branch (forest reserves) and the Dominion Crown Timber Branch (timber leases and licenses). They employ a total protection force of about 100 men.

The railways under operation in British Columbia, as the Canadian Pacific Railroad, Grand Trunk Pacific, Great Northern Railroad, make fire protection a part of the work of all their outside force, and the sole work of a special force of railway patrolmen, totalling about 50 men.

An important measure of co-operation has been secured through the appointment by the B. C. Forest Branch of various men such as Fire Chiefs of Municipalities, Public Road Superintendents, etc., as Acting Forest Guards, to a total number of about 40.

A few of the larger timber owners employ private guards on their holdings.

Altogether there are in the Province over 500 men whose duties are chiefly fire protection and another 500 men whose duties are in part fire protection.

The British Columbia Fire Protection Service has issued small pocket whetstones in attractive form to Boy Scouts and others with a warning about setting fires on the back. This is a very good move.



EDITORIAL

DESPITE the financial stress and the business uncertainty due to the European war the responses to the request of the American Forestry Association for subscriptions to its \$50,000.00 bond issue have been highly satisfactory. A number of members have already subscribed from \$10 to \$100 and several subscriptions for larger amounts have been received. The total is steadily growing, but it has a long distance to go before it reaches the \$50,000.00 mark. Members who have not done so already are asked to give the project their careful consideration. Letters describing the bonds and for what the money derived from their sale will be used, will be received by every member, and it is hoped that the subscriptions will come in steadily.

It is far from a good time to sell this class of bonds, but it is believed that the members of the Association are so interested in the importance of

its work and the need of extending it, that the entire issue will be taken.

Members of the Association and all persons interested in forestry who subscribe for these bonds should do so primarily for the purpose of helping and forwarding the cause of forestry. While the present excellent financial showing of the Association, and the results that are being attained by its magazine, *AMERICAN FORESTRY*, have encouraged the directors to make this bond issue, and there is good business prospect that the bonds will pay interest and principal, they should be taken rather as a means of aiding the cause with a fair prospect of recoupment, than as an assured investment based on real estate security, for the security depends upon the continued growth of the forestry movement and the financial success of the magazine—and this bond issue is made specifically to raise funds to better and popularize the magazine and to enlarge its field of teaching and usefulness.

AS A RESULT of the war in Europe there is almost certain to be an exceptionally large demand for forest products from both the United States and Canada. While some lumbermen and lumber manufacturers may until peace is restored find business dull, they should take advantage of this dullness to prepare for full capacity production when the war is over. If the European market is for the present largely cut off, the South American market is wide open and there should be and there are many ways in which forest products hitherto exported to Europe in large quantities can be diverted now to the markets to the south of us. When the war is over an enormous boom in trade of all kinds is expected and the better prepared the dealers in forest products are, the greater will be their gain.

The exceptional demand, when it does come, should, among other things, serve to impress upon timberland owners the necessity for protecting the forests against fire, providing where it is practicable, for new forest growth, greater utilization of timber and general conservation of our forests.

One effect of the war which will not be felt for some years will be the need, ultimately, of replacing timber of various kinds which has now to be used without being treated with preservatives, because the supply of creosote from Germany has been cut off. Railroads which have millions of ties on hand awaiting treatment will doubtless be compelled to use quantities of them untreated, as it may be some months before they can secure a new supply of preservatives.

ATTENTION is called to the article on another page about the new roadside tree law in Maryland, a law which should be adopted by every other state in the Union. Nothing adds to the beauty of our roads as much as fine shade trees and as there are hundreds of thousands of roads along which there are few if any trees and where trees could readily be grown, the opportunities for the adoption and enforcement of a road tree law in other states, should not be overlooked. While it would take years

to accomplish it is not beyond the bounds of possibility that many who are now alive will live to see every main road and every road cross country lined with fine trees which are either the property of state, county or municipality. Already the women of the country are interested in a project to plant trees along the proposed Lincoln Highway from ocean to ocean, and if the women remain interested the success of the movement is practically assured.

ALABAMA needs a state forestry department, and if the efforts of John H. Wallace, Jr., the State Game and Fish Commissioner, and the American Forestry Association are successful, one will be created. Mr. Wallace will embody in his annual report to the Governor and the Legislature, which is now being prepared, an earnest recommendation for the passage of a bill providing for a forestry department, the appointment of a state forester and a liberal appropriation for the work to be done. The American Forestry Association has furnished the draft of a bill suited to Alabama's needs to Mr. Wallace, and this will be included in the report.

These, of course, are but the preliminary steps. Before the bill can pass the people of the state must be told why the state needs a forestry department and how it will directly or indirectly benefit every resident; and the members of the legislature must be convinced that there is immediate need of the bill being passed.

It is in this work that the American Forestry Association can best participate. The success of any forestry bill depends upon educating the citizens and the legislators, and there are so many and convincing arguments why Alabama should have a forestry depart-

ment, and in fact why every state should have one, that it will not be difficult to show the people how they and the state will benefit. With the management of the state timber lands under the control of an efficient state forester and with a forestry department which will teach the owners of timberlands, wood lots, and single trees how to take the best care of them; how to derive the best financial returns from timberlands; how to make woodlots useful and remunerative and how to grow shade trees and foster them; the citizens of the state will derive practical benefits from the department which will make them sorry they were not wide awake enough to create such a department many years ago.

Commissioner Wallace has recommended forestry bills in previous reports, but nothing has come of the recommendations. Now, however, when the state legislature meets in January it is expected there will be such an insistent demand for a forestry law that the members of the law creating body cannot possibly ignore it.

In Virginia last spring, following a campaign of education conducted by the American Forestry Association a forestry bill passed the Senate unanimously and the House by a vote of 86 to 3, and if this can be done in Virginia it can also be done in Alabama.

AN aggressive campaign is now under way in Minnesota to secure the passage of an amendment to the State Constitution which will enable the state to retain state lands suited only for forests, instead of selling all such land as now provided by the Constitution. If this amendment passes it will be the inauguration of a true forest policy for the state. The Minnesota State Forestry Association is directing the campaign and has enlisted most of the newspapers and most of the progressive organizations of the state in the fight.

The campaign is directed chiefly to arousing the voters, impressing them with the need of this forestry amendment as it is called, and urging them to vote for it. So well has the campaign been planned and so ably is it being conducted that its success is practically assured.

Summed up, the situation is this: The State of Minnesota originally owned eight and a half million acres of land. Under the State Constitution, all of these lands were to be sold on the assumption that all were fit for farming. When the big pineries were removed, much of that land was found

to be so rocky and gravelly as to be entirely unfit for farming, and that land having now been cut over and burned over, will become a barren waste, unproductive, paying no taxes, a burden to the community and a bad advertisement to the state.

The issue now is this: Shall the state go ahead and follow the old policy which is now known to be partly wrong or shall it adopt another method of managing the state lands? The legislature has seen the urgent necessity of departing from the old mistaken ways and has proposed a remedy, which is embodied in No. 9, the State Forests Amendment.

This amendment provides that all those state lands which are better suited for tree growth than for farming, shall not be sold but be used as State Forests.

Nine out of ten amendments in Minnesota usually fail, and in order to make the average voter realize the fact that there is a forestry amendment to be voted on, and that it is up to his interests that this amendment pass, it is necessary that an extensive campaign be conducted.

AN HONEST FOREMAN

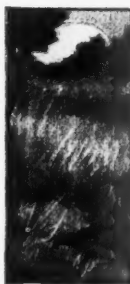
LINES PENCILED ON THE WALL OF A FLAG STATION NEAR
RAQUETTE LAKE, NEW YORK

The hiker stood on the cross-arm,
The foreman on the ground,
Said the hiker to the foreman,
"Do we quit when the sun goes down?"

"No, no," said the company's foreman,
"We work until 'tis dark."
"If that is the case," said the hiker,
"I'll take my time and start.

I'll travel the wide world over,
I'll roam from town to town
Until I find an honest foreman
Who will quit when the sun goes down."

—Transcribed by E. M. Price.



FOREST NOTES

In the effort to prolong until 1926 the operation of the Weeks law for the acquisition of forest lands and coöperation with states in fire protection work Representative Sells, of Tennessee, has introduced a bill in the House. Its chief provision is as follows:

"There is hereby appropriated for the fiscal year, ending June 30, 1916, the sum of \$3,000,000 and for each fiscal year thereafter a sum not to exceed \$4,000,000, for use in the examination, survey, and acquirement of lands located on the headwaters of navigable streams, or those which are being or may be developed for navigable purposes, provided, that the provisions of this section shall expire by limitation on the thirtieth day of June, 1926."

R. D. Maddox on the first of September took charge of the new forestry department of Tennessee which is under the direction of the State Geological Department. Mr. Maddox will study the forest conditions of the state and advise the lumbermen and other owners of timber land as to the management of their timber land. He will also study the problem of the reclamation of the gullied lands of East Tennessee.

Mr. Maddox is a native of Lincoln County, Tennessee, a graduate of the Yale School of Forestry, was for several years a member of the Bureau of Forestry of New Hampshire and was last year in the Department of Forestry at the State College of Pennsylvania.

At a recent meeting of the Forest Products Exposition Company it was decided that another large exposition should not be held in Chicago or New York during the coming year, because of the complications created by the San Francisco Exposition, and for other reasons, but it was recommended that plans for the holding of the same in the year 1916 be inaugurated as early as practicable.

The firm of Fisher & Bryant, consulting engineers, has been dissolved, and the business has been taken over by George T. Carlisle, Jr., with headquarters at 386 Hyde Park Ave., Roslindale, Mass., a well-known forester. Mr. E. S. Bryant, one of the members of the former firm, is now with the Forest Service and is stationed at Washington, D. C.

As a part of a systematic campaign for forest fire protection which the forest branch is conducting in British Columbia under the direction of H. R. MacMullen, chief forester, 1,000 pocket whetstones are being distributed among the boy scouts of British Columbia. On the reverse side of the whetstone is the inscription: "Build Camp Fires in Safe Places. When You Leave Put Them Out. Boy Scouts be Prepared. Help Protect Our Forests." Altogether more than 50,000 circulars, posters, pictures, pocket whetstones, etc., have been distributed all over the Province to lumbermen, woodsmen of all kinds, newspapers, banks, hotels, stores, clergymen, school children, etc., and the response has been most gratifying.

A report from Bangor, Me., says ten steel lookout towers for Maine forests have arrived and will be at once installed on the following mountains: Mattagamon, Trout Brook and Beetle on the East Branch of the Penobscot; Mattamiscontis, on Penobscot waters; Three Brooks in the Squa Aroostook; Kennebago, near Rangeley; Mulhedus on the southwest branch of the Penobscot above Moosehead; Ragged and Sourdnahunk, in from Norcross. This makes a total of thirty steel and three wooden towers that have been put up this year in addition to ten portable houses located where towers were unnecessary.

A movement is on foot at Shreveport, La., to make it possible for the school children of that city to secure an education in tree knowledge. It is the intention of those behind the movement to have on hand at all times samples of all trees in the bark and after being manufactured so that the school children may acquire a knowledge that may be of use to them in later years. Another movement on foot in that city is to have all of the trees adorning the highways of the city labeled so that not only the children but grown people will be able to ascertain the difference between the various kinds of southern trees.

Prof. Alfred Akerman, of the College of Agriculture at Athens, Ga., writes: "I am leaving the College of Agriculture here at Athens this fall, for a timber tract in Greene County. My work will be reorganized along somewhat different lines, greater emphases being placed on the outdoor part of the curriculum. Over 900 acres have been secured in Greene County and another place of 300 acres in Towns County on the other side of the Blue Ridge. For the present the place in Towns will be used only for summer camps. A sawmill is to be put on the Greene County tract and the forest is to be worked on a business basis, but also with a view to its use by the students for experimentation. A site for a winter camp has been secured in Florida. It

is proposed to mount the students, beginning next year, and to make the trips to the mountains and to Florida on horseback. The course is to be of three years duration. One of the terms is to be spent in Towns and one in Florida. This will give the men a chance to study all of the important timber trees of the eastern part of the United States, except the spruce. At present there are no buildings on the headquarters place in Greene County, and tents will be used until some bungalows can be built.

I have dreamed for five years of a forest school in the woods, and now my dream is taking shape.

Owing to the war the president and directors of the Canadian Forestry Association have, after the most careful consideration, decided to cancel the arrangements for the forestry convention which was to be held in Halifax, September 1 to 4, 1914, and to postpone the convention indefinitely. Whatever it is decided to do in the future, due notice will be given thereof to the members and all others concerned.

The New York Conservation Commission is making exhibits at thirty fairs in New York State. These exhibits consist of sample forest plantations and planting material. A representative is present at each one of these places to give information in regard to reforestation, taxation, handling woodlots, etc. Literature along these lines is also distributed.

A tabulation of the forest fires in New York State, completed August 10, shows 208 fires, 9,650 acres burned, causing \$6,304 damage, and costing \$6,463.24 to extinguish. It is interesting to note that as usual practically all these fires were due to carelessness. Smokers caused seventy-seven; fishermen, thirty-eight; railroads, forty-one; campers, eleven. The commission is endeavoring to reduce the danger of fire from this cause by increasing its educational work and by prosecuting people who cause fires negligently. Considerable anxiety was felt recently on

account of the heavy pall of smoke which overhung the Adirondacks. This smoke was not due to fires within this territory, but on account of the forest fires in the province of Quebec.

F. A. Gaylord, who for the last four years has been one of New York State's foresters, has resigned his position and accepted appointment of the Nehasane Park Association. He will have charge of the property and will plan and carry on lumbering operations.

Four hundred and sixty thousand feet, nine hundred and ten logs have been loaded on seventy cars in a nine-hour day! That's five logs every three minutes throughout the day, or eight hundred and fifty-two feet a minute. This splendid record was made by Loaderman A. B. Cochran for the Gulf Lumber Company at Fullerton, La. A stiff-boom McGiffert Loader was used. The rest of this record-breaking crew consisted of W. A. McCormick, fireman; Dock Jordan, Will Kile, Red Bass, Bob Franklin, and Charles Revells.

Montana's new School of Forestry opens its doors on September 8. Full courses in scientific forestry and in logging engineering are to be in the hands of expert instructors, and no effort will be spared to provide for all students the best and most practical and up-to-date courses of instruction. The new School of Forestry is a department of the University of Montana, located at Missoula. The location is peculiarly advantageous in its relation to the work of the federal forest service, and its position in a forest region of great importance, both scientific and economic, and in the special opportunities offered in a new and rapidly growing section of the country. Mr. Dorr Skeels, an expert logging engineer of the forest service, has been selected dean of the school.

The State of New York will be one of the greatest forest producing states of the Union because nearly half of the

land surface is better suited to the growing of forests than any other crop from the soil. Furthermore, its forest area is surrounded by waterways leading to the best of markets and it does not have the severe topographical difficulties met with in forest areas of the Appalachian and Rocky Mountain sections. The practice of Forestry on these forest lands will be simple because of ease of access, right climatic and soil conditions and nearness of market. On lands not nearly as well suited to the growing of forests as the half of New York which is essential forest land, the countries of Europe are producing from two to five dollars per acre per year from forests.

Richard James Donovan, of New York City, whose interest in tree planting in the Adirondacks was described in the August AMERICAN FORESTRY, writes in regard to the planting of 100,000 white pine and Scotch pine: "I have just returned from a couple of weeks' visit to the plantation and I find that of the Scotch pine planting this year not more than 1 per cent have died and of the white pine not more than 5 per cent. The white pine is far more delicate than the Scotch pine. If the white pines are planted in open grounds without any saplings or cover of undergrowth on light pure soil, they are a little difficult to get started and some of them will die, but if they have cover of small trees or saplings such as white birch or poplars and bushes of any kind, so that during the first few years after they are planted they have shade very few of the trees die. The white pine tree in its youth needs the shade. The Scotch pine may be planted in pure white sand and exposed to the sun and more than 90 per cent of them will live. This has been my experiences in planting 365,000 pine trees in the Adirondack Mountains.

The National Conservation Congress which meets in its sixth annual session at New Orleans November 10-14, will devote its chief consideration to three leading topics, floods and their damage,

the conservation of wild life, and child welfare.

The directors of the American Forestry Association have decided to hold their fall meeting at New Orleans at the time the Congress is in session.

Tree planting exercises have been or are being held in all parts of Chicago, about 250,000 white pine seedlings being provided for yards, vacant lots and roadways. Last years 200,000 elm seedlings were planted; the year before 300,000 Russian mulberries, and in 1911 a total of 280,000 catalpa seedlings were given a chance to grow. If all these grew Chicago would be not a garden city, but a forest city. The mortality rate among seedlings in Chicago, says the Chicago *Herald*, however, is almost as great as it is among slum babies. If a respectable fraction of these young trees grow to maturity Chicago will be in time a woodland paradise. An authority on arboriculture as applied in cities, says the ratio should be one living shade tree to every five inhabitants. In the absence of a tree census it is impossible to say how near Chicago approaches this ideal.

The New York State College of Forestry at Syracuse has estimated that the utilization of the maturing and dead timber on the New York State Forest Preserve of something over 1,600,000 acres should yield a revenue

of over \$1,000,000 every year and this without impairing the value of the forest for future timber supply and watershed protection. This is saying nothing of a common-sense use of thinnings from the growing forest crop. New York is losing a very large revenue annually through not using its forest lands.

Carl Schwiz Vrooman was sworn in as Assistant Secretary of Agriculture on August 17, succeeding Dr. B. T. Galloway. Mr. Vrooman was born in Macon, Mo., October 25, 1872. He attended Washburn College, at Topeka, Kan., and later was graduated from Harvard University, in 1894. He also attended Oxford University. Mr. Vrooman began writing on publicity questions as early as 1894, and has contributed to some of the prominent magazines. He is the author of several books, including "Taming the Trusts," published in 1900, and "American Railway Problems," in 1910. Mr. Vrooman, by reason of seven years spent abroad investigating social and economic conditions, and by reason of scientific farming conducted on his large estates in Illinois, is declared to be peculiarly fitted for the position vacated by Dr. Galloway. For a number of years Mr. Vrooman has been carrying on his scientific farming near Bloomington, Ill. He started with about 2,000 acres of land, and today has nearly 6,000 acres under cultivation, it is said.

BOOK REVIEWS

Mechanical Properties of Wood by Samuel Record, M. A., M. F. (John Wiley & Sons, Inc., 165 pp. Price, \$1.75). Mr. Record is the assistant professor of Forest Products at the Yale Forest School, and the book was written primarily for students of forestry to whom a knowledge of the technical properties of wood is essential, but it is believed that it will also prove a valuable text for students of civil and mechanical engineering. The mechanics involved is reduced to the simplest terms and without reference to higher mathematics, with which the students are rarely familiar. The intention throughout has been to avoid all unnecessarily technical language and descriptions, thereby

making the subject matter readily available to everyone interested in wood. In Part I the numerous tables giving the various strength values of many of the important American woods demand attention. Part II will interest all who are concerned with the rational use of wood, and to the forester also, to whom it will suggest means of regulating his product. Part III gives the methods of timber testing for the most part followed by the U. S. Forest Service. The Appendix should also prove of value in its suggestions to the independent investigator, while the Bibliography adds considerably to the worth of the book.

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